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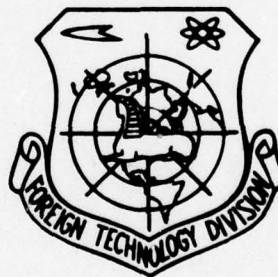
FOREIGN TECHNOLOGY DIVISION



IN THE RHYTHM OF THE SUN

by

A. L. Chuzhevskiy and Yu. G. Shishina



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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ë in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh ⁻¹
cos	cos	ch	cosh	arc ch	cosh ⁻¹
tg	tan	th	tanh	arc th	tanh ⁻¹
ctg	cot	cth	coth	arc cth	coth ⁻¹
sec	sec	sch	sech	arc sch	sech ⁻¹
cosec	csc	csch	csch	arc csch	csch ⁻¹
		Russian	English		
		rot	curl		
		lg	log		

FTD-

ID(RS)T-1601-77

MACHINE TRANSLATION

FTD-ID(RS)T-1601-77

17 November 1977

IN THE RHYTHM OF THE SUN

FTD-77-C-001443

By: A. L. Chuzhevskiy and Yu. G. Shishina

English pages: 209

Source: V Ritme Solntsa, Izd-vo "Nauka", Moscow
1969, pp 1-112.

Country of origin: USSR

This document is a machine translation
post edited by Marilyn Olachea.

Requester: FTD/ETCK

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In the interest of economy and timeliness, the original graphics have been merged with the computer output and editing has been limited to that necessary for comprehension. No further processing is anticipated.

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Page 4.

Similar to large spacecraft, ^{a)} ~~wanders~~ our planet ^{travels} ~~in~~ the universe. ^{The} "Sheathing/skin" of ship (atmosphere) is durable and reliable. Directly, without instruments, we do not ^{perceive how} ~~percept as~~ space storms from time to time "shake" the hull of ship. But the region of the Earth, in which we live, ^{- the} biosphere, is not isolate, ^{It is} insulated from the storms, which ^{space} are developed in ~~Kosmos~~. ^{are} Especially affect ^{by} ~~it~~ the changes, which occur on the nearest star - on the Sun. They ^{are} immediately ^{responsible} ~~answer~~ ^{for} on all terrestrial processes, including on the processes of life. Attempting to understand the mysteries of terrestrial life, humanity since olden times ^{has} it turned ^{do for on} "after answer/response" to the Sun. The first random observations, and then the systematic study and the comparison of the periodic processes of solar activity and many biological phenomena on the Earth showed that between them there is a close connection. ^{The} Manifestation, and also the mechanisms of the emergence of numerous sun-earth biological ~~communication~~/connections is ^{the object of a} ~~investigates~~ young scientific discipline - space biology, more precise ^{by a} ~~its~~ separate ^{field} ~~region~~ - heliobiology. ^{To} The history of the emergence of heliobiology, ^{and to} ~~to~~ its first step ^S ~~pitch~~ is devoted this book.

Page 5.

The life of an individual organism is only a fragment of the life of the universe.

Claude Bernard.

From myths to science.

"I am your ^{own} born son, o Aton, bearing the sacred name to the ^{nearest} outer heights of the universe, where in songs you ^{are} ~~is~~ always sung. Grant to me forces, o Aton, with your sons good ^{by} ~~road~~ ^{single} to strive ⁱⁿ ~~for~~ your always rejoicing world/light" ¹.

FOOTNOTE ¹ Ancient Egyptian hymn to the Sun, translated by A. L. Chizhevskiy. END FOOTNOTE

With such words they turned to the Sun in ancient Egypt.

"Bright, shine ^{ing}, is mightier ^y, the life-giving, ^{glowing} ~~glaring~~ heart of

world", ^{with} ~~to~~ such enthusiastic epithets ^{parts} always rewarded the Sun the poets.

^{Another} "series star in the system of Milky way, ^{one more} usual yellow dwarf
^{thus} ^{categories} ^{the} ...", ^{dryly} qualify the Sun contemporary astronomical
~~management~~ manuals and catalogs, emphasizing the resemblance of our
 heavenly body to the myriads ^{of} other ^s scattered in the boundless
 Universe stars. However, ^{behind} ~~after~~ the impassivity of scientific terms,
 just as ^{behind} ~~after~~ poetic metaphors, lie the same feelings: admiration,
 surprises, the appreciation: ^{for both then} ~~Since earlier~~ and now ^{man} ~~men~~ realizes,
 that the role of the Sun in its life is ^{actually very great} ~~extreme~~ in truth.

If the Sun suddenly went out, the Earth ^{and} everything, which lives
 and is glad in its ray/beams, would ^{be} ~~encompass~~ ^{ed by} the killing
 interstellar cold. Without solar energy our planet forever would
 remain ^a ~~the~~ piece of dead slag, on it could ^{never have} ~~not arise~~ and be developed
 the life, never would ^{how} ~~appear~~ ^{at} people.

Page 6.

But indeed ^{to} ~~from~~ the ^{seemingly} ~~which~~ ^{we} ~~seems~~ ^{get} ~~inexhaustible~~ ^{only} riches of solar
 radiations ^{yet} ~~to us is obtained~~ ^{in all the} half of its billions th ~~worth~~
 part. But also this energy completely ~~it~~ suffices ~~in order~~ to fill
 the Earth by all possible manifestations of vital activity.

^{the} Biosphere, wrote academician V. I. Vernadskiy, actually can be considered as ^{the} region of the earth's crust, occupied ^{by} with the transformers, which translate/transfer cosmic radiation into efficient terrestrial energy - electrical, chemical, mechanical, thermal and so forth. The cosmic radiation, ^{coming} which ^{go} from all celestial bodies, penetrates ^{all of it} its entire and everything in it. We recover and realize ^{2/} the only (negligible part of these radiations.... Their ^{determination} account and understanding is ^a the matter of the future. But ^{yet} are indisputable ^{by} not they, but Sun rays cause the main features of the mechanism of biosphere. Research on reflection on the terrestrial processes of solar radiations already is sufficient for obtaining the first, but precise and deep representation of biosphere as of ^{a/} terrestrial and space mechanism. ^S By ^{and} the sun ^{penetrates} radically ^S is reworked and changed ^S the face of the Earth, is ^a pierced and enveloped biosphere. To a considerable extent the biosphere is ^a the manifestation of its emission/radiations" ¹.

FOOTNOTE ¹ V. I. Vernadskiy. The biosphere as a region of the conversion of cosmic energy. Selected works, vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

This extreme role of the Sun in all manifestations of life on the Earth ^{was} indisputably intuitively understood ^{by} our distant predecessors - peoples of antiquity. Is noticeable that that among an enormous quantity of the ^{gods} created by human imagination ~~gods~~ the first place long time in all peoples belonged to the god of daylight - to the Sun. ^{By studying} ~~Being occupied~~ by the history of astronomy, which ^{was} conceived itself at ^{the dawn} ~~twilight~~ colors of human history, ^{the} English scholar Olcott gathered enormous material about the value of the sun in the ancient folklore of Assyria, Phoenecia, Egypt, Greece, Peru, Mexico, and also in the representations of contemporary American, African, and Oceanic peoples. Historical and comparative mythology attests to the fact that all ^{peoples} ~~without exception/elimination~~ ^{part} ~~peoples~~ in their ideology returned indispensable "tribute to the Sun". In ^{the} sagas, legends, myths, legends, superstitions, which arose on completely different soil, ^{the} ~~historian~~ ^{is struck by the} ~~it strikes a~~ deep resemblance of the content.

Page 7.

If we trace the evolution of solar cult, it is possible to be convinced of that, it ^{was} ~~lay as~~ the basis not only of religious, but also scientific thinking. The Sun ^{was considered} ~~read a little itself by~~ the main deity ^{even} ~~an additional~~ of seven millenia back into ancient Egypt.

The climatic conditions made Egypt very dependent ^{on} ~~from~~ this wilful deity's whims (in Heliopolis they called it the god Ra, in Elfa - Aton). It first melted snow on the slopes ^{of} south mountains, causing the overflows of the Nile, waking up to life the turbulent vegetation of ^{the} ~~fine~~ ^{alluvial} ~~sediment~~ plains, then periodically it dried up the richest granary. The Egyptians, who believed, that the sun created everything living on the Earth, attentively ^{monitored} ~~controlled~~ it. Research on the Sun led, for example, the Egyptians to the creation of chronology. They managed to determine the duration of year 365.25 days.

Persians, Babylonians, the Chinese, the Japanese, the slavs also ^{considered} ~~read~~ a little the Sun as source of life, fundamental principle entire real. ^{The Hellenes attributed} (An especially important role to the sun ~~abstract/removed~~ in their philosophical views ~~hellenes~~). (From the representations of the Sun arose in Ancient Greek language such concepts and words as "law", "order", "harmony", "count". They all have "solar" roots). In the history of ^{ancient} ~~antique~~ world there was a period, when to the Sun as to the initial reason, were ^{attributed} ~~elevated~~ all phenomena of nature. "Only the sun by its shining world/light gives life", said ^{inscriptions} ~~label~~ in Diana's temple in ^{Ephesus} ~~sword~~ ~~hitt~~. Idea about the supremacy of the Sun was ^{into a} ~~designed into~~ the ordered philosophical theory, which ^{left an} ~~put~~ indelible

^{imprint}
~~press~~ on the thinking of ^{the ancient} antique person.

Acquaintance with the history of the development of human knowledge leads to ^{the conviction} ~~persuasion~~, that the main directions of natural sciences, including the science of the Sun ^{here} ~~conceived themselves~~ in the very distant past. Into the philosophical studies of ionic school, into the beliefs of the Hindus, ⁱⁿ ~~to~~ the sagas of Scandinavians ^{we find} ~~depart~~ the roots of many contemporary hypotheses about the structure of material and the nature of world.

^{It} Would be to absurdly dispute the ^{great} ~~grandiose~~ successes of the science of our days, to preach return to ^{past} ~~backwards~~ or sing dithyrambs to the intuitive abilities of ancient person, but ^{it is} ~~also~~ difficult to agree with the opinion that for the ^{people who lived once} ~~lived~~ there is no time peoples ^{have no ideas about a} ~~could not be hit upon before the real representations of~~ charitable, creative life on the Earth, the creative force of the Sun, ^{and} ~~that the~~ countless myths - these are the only naive fairy tales.

Page 8.

They ^{are} ~~the~~ result of centuries-old collective experiment, ^{were} ~~the~~ result of the work of the generations inquisitive, ^{non-folkloric} ~~not~~ tired, and ^{at times} ~~new~~ and ~~then~~ also the brilliant observers of the natures whose names are almost lost. ^{thus} ~~so~~, one of the greatest scientific generalizations -

heliocentricism - was born long before Copernicus, whom it is
 now accepted to consider ^{up to be its} creator. Heliocentricism ^{was} preached ^{as}
^{for each as} additional 2100 years ago ^{by} Aristark Samoskiy. As ^{the impetus} jerk/impulse ^{for} to the
 emergence of heliocentric representations indisputably ^{was} served the
 obtained from the ancestors ^{idea} persuasion ^{of} about the supremacy of the Sun
 in the Universe, which was so sympathetic "Apollinicesko-solar"
 shower of Greek ^{idea}.

But the brilliant guesses of ancient thinkers subsequently were
 forgotten for a long time. ^{Then replacement was} To replace to them came the geocentric
 ideology, according to which the Earth is the "center of the
 Universe".

It is difficult completely to evaluate that great loss, ^{sustained} which
^{by} applied the creator of the scholastic theory, ^{Claudio's} of Klavdiy Ptolemey's
 universe to the development of natural sciences.

The blinders of geocentric ^{concepts} representations narrowed in the
 consciousness of people ^{their} of the framework of world, they surrounded
 the Earth ^{with an} by the imaginary impenetrable wall, which ^{always}
 separate ^{eternally} liberated it from the always being agitated element - by the
 Universe, they gave to the Earth ^{an} the aureole of the nonexistent
 exclusiveness, they directed scientific ^{research} searching ^{in a direction} along knowingly
^{known to be} fruitless way. ^{passed} Pass seventeen centuries before ^{how} was found

dare-devil and great thinker, Nicholas Copernicus, who dared to tear away from the Sun ^{this enveloping} its wrapped film of geocentric conjectures, to ^{disperse} scatter the darkness of superstitions. From Copernicus, according to of F. Engels, "begins ^{the} its chronology ^{of} the release of natural science from theology" ¹.

FOOTNOTE ¹ K. Marx and F. Engels. Collected works, vol. 20, p. 347.
END FOOTNOTE

The further course of developing ^{ment of} the knowledge it is ^{inevitably} newly inevitable to turn ^{ed} science facing the Sun, ^{toward} to Kosmos, ^{the} and there ^{began a} beginnings the ^{ever} slow, and then whole being accelerated departure ^{withdrawal} from the idealistic geocentric views to the materialist representations ^{concepts} of universe, ^{contained in} exposed ^{cosmic} persistent in space foreshortening. This complex process of the release ^{liberation} of science from geocentrism - the overestimation and the reconsiderations of geocentric representations in natural science ^{was} successfully named ^{by the famous} known Soviet philosopher ^{which} by Ye. T. Faddeyev the "cosmization of science", ^{that} ^{which} began more than 300 years ago, did not end and until now.

"Our entire official physics, chemistry and biology ^{are} ~~it is~~ exclusively geocentric, ^{and} are calculated only for the Earth" ¹, wrote F. Engels a total of one hundred years ago.

FOOTNOTE ¹ K. Marx and F. Engels. Collected works, vol. 20, p. 553.

END FOOTNOTE

In many respects ^{his} its word are valid even today. Not ~~the~~ always ^{is he recognized} realized inertia of geocentric views still ^{so} great, and no one will be decided to relate geocentricism ^{entirely} with pillar to the past of science, ^{to} into its history.

But although the ^{muffled} ~~anechoic~~ echo of geocentricism still ^{resounds} ~~is given~~ up in many ^{corners} ~~angle irons~~ of natural science, ^{occasionally preventing us} ~~interfering to now and~~ then "hear" ^{ing, he} new and obvious ^{truths}, it would seem, ^{that} ~~truths~~ the cosmization of science occurs by ^{are occur at accelerated} ~~impetuous~~ rates, especially in the last/latter decade after ^{the} ~~having emerged~~ ^{we} of man into outer space. ^{very rich} ~~The~~ Review of the ^{cargo} ~~accumulated richest luggage~~ of scientific facts under the sign of ~~communication/connection~~ of terrestrial phenomena with the events, ^{is also being done} ~~which are accomplished~~ in the Universe ^{Before} ~~goes also~~ in biology, and in chemistry, and in medicine. ~~on~~ our eyes are born new disciplines: space physics, aerospace biomedicine, space agrochemistry,

heliobiology, etc. And although the "process of the release of natural science" from the captivity of the ~~became~~ ^{increasingly} obsolete geocentric ideas is not finished, the ^{outcome} ~~issue~~ of the cruel ideological battle, initiated by the titans of the Renaissance - Copernicus, Galileo, Bruno, is decided beforehand.

Because of the rapid development of science and technology of the sun, man ~~learned about this star during the last three~~ observation ^{centuries}, especially ~~for~~ the latter two ~~of~~ decades (after the birth of radio astronomy, x-ray astronomy, gamma-astronomy) ~~are~~ more than for the preceding/~~previous~~ millenia.

But this all the same does not mean that the contemporary astronomers delete that enormous factual material, which was with ^{such} ~~this~~ work accumulated by their predecessors.

From the ~~torque~~ ^{produced} moment of invention by Galileo in 1610 of the first telescope, ^{which followed} prepared as many following, by his ^{own} ~~inherent~~ hands, the sun ^{was} constantly observed ^{by} (the inquisitive eyes of ~~the~~ researchers. From this time the facts of solar biography began to be supplemented with ^{ever} ~~whole by~~ the increasing speed. After the Second World War ^{was} ~~born~~ a new science ^{was born} - radio astronomy. ^{Am} (Event ^{no} ~~not a bit not the less~~ significant, than ^{the} invention of telescope).

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Page 10.

Galileo presents his telescope to the doge of Venetian republic (from the picture of Luigi-Sabotelli).



Observations of the Sun until recently ^{were} ~~they~~ conducted only through the "optical window" of transparency in the atmosphere, i.e., in visible light. (Earth's atmosphere ^{admits} ~~passes~~ the electromagnetic waves of optical ^{range with} ~~s-band~~ wavelength more than 0.3μ and shorter than several microns. But eye ^{captures even} ~~recovers~~ and that less - wave from 0.4 to 0.75μ). The information, which ^{were} ~~they~~ brought from Kosmos ^{by} ~~other~~ forms of emission/radiations, in particular radio wave, ^{has} ~~it~~ remained that ~~which was~~ not deciphered. But the Universe, yes even Sun itself whispers, speaks and makes noise to different voices on waves with a length of from ^a ~~the~~ negligible portion/fractions of ^{an} ~~angstrom~~ to the hundreds of meters and more !

^{After} ~~After~~ depriving of the optical method ^{of a} ~~monopoly~~ in Solar research, radio astronomy ^{greatly expanded} ~~unusually it moved apart~~ the boundaries of knowledge. To interpretation became available waves from several millimeters to several dozen meters. (Longer waves the earth's atmosphere ^{admits} ~~barely passes~~). And if earlier the only world/light told to us about, ^{what occurs} ~~that which is made in~~ distant worlds, then now "solar news" communicate to us the electromagnetic waves of any length: from ^{hardest} ~~the most rigid~~ - gamma-rays to the longest - radio waves.

Page 11.

^{A real} ~~Authentic~~ revolution in physics of the Sun produced contemporary

rocket engineering. Now man obtained possibility not only to follow the Sun from the Earth, but also to send into ^{the Cosmic} space ocean flying laboratories - satellites, rockets and interplanetary space stations. The equipment, raised on satellites and rockets, made it possible to record the going from the Sun electromagnetic and corpuscular radiation, ^{emitted by Sun, whose path to Earth the} ~~by which the~~ (atmosphere and geomagnetic field intercept to the Earth. The contemporary researchers of the Sun already dream about that near future, when ^{now} ~~about the Earth begin to be on duty the~~ ^{there will be} constant "patrols of solar radiation", ^{which} ~~that~~ transmits with the aid of the telemetry of information about all oscillation/vibrations ⁱⁿ ~~of~~ the activity of heavenly body. They assume also to take part in the work of observatory on the Moon, the plan/layout for building ^{of} ~~which~~ has already been discussed at the international congresses on astronautics.

^{Looking back on} Being ~~examined~~ ^{even imagine} to the passed by astronomy path, it is difficult to still comprehend entirely ^{the} ~~that~~ enormous jump, which it ^{made} ~~completed~~ ⁱⁿ ~~for~~ the latter ^{at} three centuries and, especially ^{over} ~~for~~ the latter ^{at} of 20 ~~summer~~ years.

From poetry of myths and solar hymns, to the contemporary study of the biological role of the Sun; from superstitious views and the dim guesses of ancient solar theory to the heliophysics of our days, from the ancient Egyptian and ancient Greek temples of the Sun to the

authentic temples of science, observatories and ^{great} grandiose
radiotelescopes, ^{performing a} ~~carrying~~ ^{and} the special ^{to} constant service of the Sun, -
this is the way of the steady development of Solar theory. The
Centuries of the ^{brilliant} ~~bright~~ development of science were required in order
that the man could at least a little approach ^{an} ~~itself~~ the
understanding of the complex physicochemical processes, occurring
both in the solar substance and in the sphere of solar effect. From
^a deity the Sun in the consciousness of people gradually was converted
into real space force - the ^{primary power behind} ~~energy initial cause~~ of many phenomena in
the inorganic and organic life of the Earth.

The solar gods now rest in the cold halls of museums. Is long
forgotten Sun worship! Contemporary person no longer emerges ^{from} ~~to~~
^{his house before dawn to turn} ~~twilight colors from house in order, turning~~ facing the east, to
greet the first ~~ray~~ beams of the ascending heavenly body. But, as
before, humanity ^{constantly} ~~nonseparably~~ ^{at} looks ~~himself~~ and listens to the life
of the sun. All events, which ~~are~~ developed on it, become the subject
of scrupulous scientific investigation. And now no longer in
superstitious fantasies, but in science the sun comes forward as
source of life on the Earth. By ^{his} ~~hard work~~ ^{has explained} ~~explains men~~ the place,
which occupies our heavenly body in the Cosmos.

Page 12.

"Illuminating lamp of world".

How does
~~Without doubt~~ *does answer* contemporary science *the question,*
what Sun is and *what is the source of the* ~~whence are taken the~~ apparent inexhaustible supplies
of energy (3×10^{33} cal. yearly), which *for* ~~thus~~ already about five billion
~~summer~~/years with *such* ~~this~~ generosity *has* ~~does~~ sent into the surrounding
space?

Similar to other stars of Milky Way the Sun is ⁹the giant (by
diameter 1391 thous. km) rotating sphere of the incandescent gas,
density and temperature of which they grow with depth. In the
interiors of this cluster of the blazing material, where the
temperature reaches 20 million degrees, pressure - 200 million
atmospheres, and the density of substance ten time exceeds steel
density, is realized nuclear reaction. In it participate ~~the~~ atomic
nuclei, from which are stripped the electron shells. The base mass of
the Sun - 60% ^{is} ~~compose~~ ^d the nuclei of hydrogen - the protons, which
enter between themselves ^{into} ~~in~~ the so-called proton-proton reaction. In
this case are formed the larger nuclei of helium, and are
~~separate~~/liberated colossal quantities of thermonuclear energy.

From the viewpoint of ^{the} physicist ~~Solntse~~ ^{the Sun is} nothing else but the colossal natural nuclear reactor, moved away from the Earth up to a comparatively safe distance, which possesses ^a mass ^{of} $(2.24 \times 10^{27} \text{ t})$. This reactor ^{over} ~~during~~ ^{ab} billions ~~summer~~/years continuously processes into energy its own substance: each second 4 million t of solar substance is scattered in space in the form of diverse emission/radiations. Besides electromagnetic radiations - the gamma-rays, X-ray, ultraviolet, light, infrared, radio waves - the Sun throws out into outer space ~~the~~ flows of ~~the~~ electrically charged and neutral particles of the different energies. However, ^{the} ~~overwhelming~~ majority ^{of all energy} ~~entire~~ the ^{within} emitted by the Sun ~~energy~~ falls ~~on~~ the fraction of light and infrared rays.

Page 13.

^{The} ~~To the~~ Earth ^{receives} will ~~come along the~~ minute quantities of solar energy. ^{Yet even half} But also the halves of its one billions ^{the} ~~worth part as~~ ^{as} has already been said, ^{is} completely are sufficient in order to warm the Earth, constant ^{by} ~~invariably~~ accompanying the Sun together with the remaining large and small planets of the solar system in ^{its} ~~his~~ space wanderings. The Sun is ^{the} ~~a~~ center of ^{an} ~~the~~ extremely harmonious, ordered system of planets. The "illuminating lamp of world, which reigns in center",

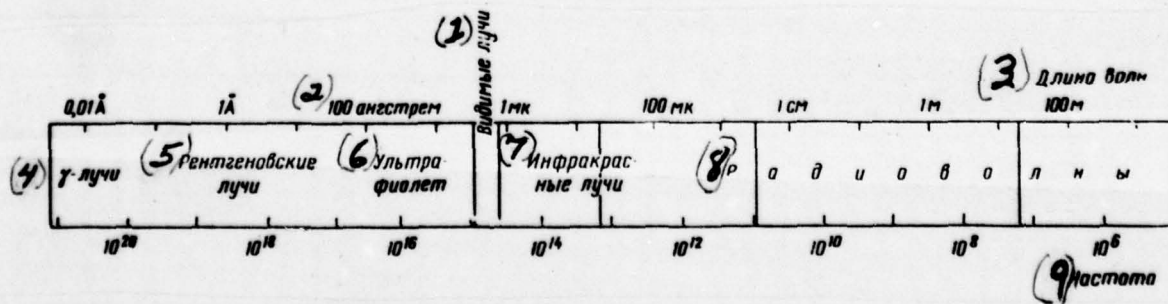
as Copernicus called it.
~~thus called named it~~ Copernicus.

The mass of the Sun ^{is} 150 times ^{greater than} ~~is more~~ the mass of its accompanying planets. And the Earth, and Neptune, and Pluton, which moves ^{in a} along the peripheral orbit of system, ^{are easily} ~~with lightness/ease~~ are held by the forces of solar gravity, which subdue their gusts to fly away from each point ^{on} of their ^{path} ~~way~~ tangentially into the darkness of infinite space.

^{get from the} Us disengage sun 149.5 million km. ^{Is this much or little?} ~~Much this or is small?~~

All terrestrial distances are negligible in comparison with this really/actually colossal distance. Therefore ^{we acquired the} ~~took root habit to~~ consider that the Sun is extremely ^{distant} ~~moved away~~ from the Earth.

However, everything becomes known in comparison. In order correctly to evaluate distance from the Earth to the Sun, ^{it is} ~~are most~~ ^{best not to use} ~~better used not~~ absolute unit of linear measures, but ^{relative} ~~values~~ relative. Then the Earth turns out to be that ~~which was moved away~~ ^{only} from the Sun in all to 107 solar diameters.



Key:

Scale of the electromagnetic waves emitted by the sun. 1. Visible ray/beams. 2. 100 angstroms. 3. Wavelength. 4. Gamma-rays. 5. X-rays. 6. Ultraviolet. 7. Infrared rays. 8. Radio wave. 9. Frequency.

Page 14.

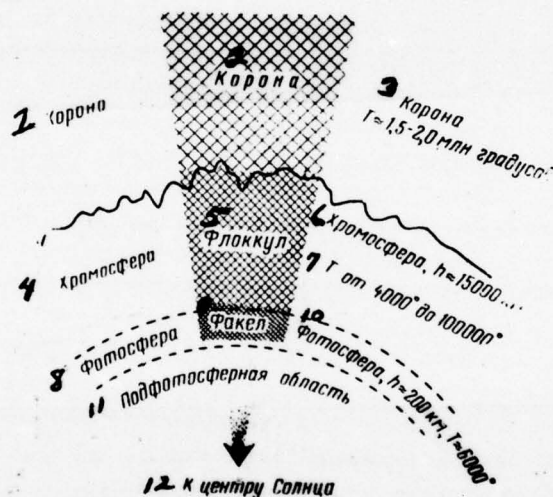


Diagram of the consecutive layers of the Sun atmosphere (its shaded active region).

Key: 1. Corona. 2. Corona. 3. Corona $T=1,5-2,0$ million degrees. 4. Chromosphere. 5. Floculi. 6. Chromosphere, $h=15000$. 7. T from 4000° to $10,000^{\circ}$. 8. Photosphere. 9. Flame. 10. Photosphere, $h=200\text{km}$, $T=6000^{\circ}$. 11. Subphotospheric region. 12. To the center of the Sun.

After ^{taking} accepting into consideration the enormous power of the occurring on the Sun physicochemical processes, the value of diameter, the extent of atmosphere, we will be convinced of the fact that the terrestrial globe falls into the zone of its direct effect. ^{As expressed by a} According to the expression of the noted researcher of the stars interiors Artur Eddington, "The Sun proves to be ~~in us~~ ^{us} near at hand".

The rarefied exterior layers of solar atmosphere are spread to millions of kilometers in different directions. Our planet literally bathes in solar ray/beams. Moreover, in comparison with other stars the Sun is so close ^{to} us, that we even can scrutinize and study its surface directly from the Earth. With the aid of optical instruments to reveal/detect ^{enveloping} wrapping the Sun layers and it is possible to trace the occurring in its atmosphere processes in such details, as if the Sun was transferred into terrestrial laboratory, and we would begin "to remove/take" its wrapping shells.

Page 15.

Conditionally ^{the} solar atmosphere ^{is broken down into} ~~subdivide~~ on several layers, which convert without sharp boundaries one ^{into the other} ~~in another~~: the external, most rarefied layer - the corona, ^{the chromosphere} ~~which lies beneath~~ ^{and is of} ~~chromosphere~~ of red color, colored layer and reversing layer. The latter composes the upper layer of photosphere - emitting layer

(^{photos}photo-with" - in Greek world/light).

Photosphere - ^{is a}the layer of gas is not more than 200 km ⁱⁿby thickness, the visible glaring surface of the Sun, ^alight barrier, deeper which our eye penetrate cannot... .

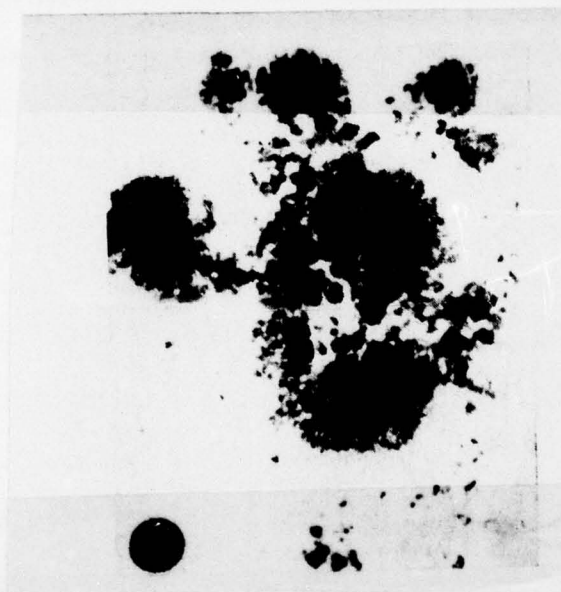
The seething, mutinous solar element never remains calm. ^{Over}It that ^{it}here occasionally also ~~matter~~ furrow the mighty, glittering waves - granules, ^{visible}seen from the Earth as enormous rice grains. On glaring solar disk there appear and they move spots, ^{luminesce}themselves bright areas/sites - flames, ^{and there}appear chromospheric flares. Upward take off the glowing fountains - protuberances. Even the corona of the Sun does not have ^apermanent mold. ^{In place it}It ~~first~~ is compressed, ^{in places}then widely ^{unfurled}it is straightened. All these manifestations of solar vital activity sometimes sharply are amplified. This means that the ^{Sun, up}calm to that ^{this has}Sun entered the phase of the increased solar activity.

Two-faced Janus.

In star catalogs the Sun figures as as usual dwarfish ^{it is}weakly-alternating/variable star, because in some wave bands ~~of its~~ ^{distinguished by a}differs the surprising constancy of emission/radiation. If we began

draw conclusion about
to ~~conclude~~ about the "mode/conditions of the work" of the Sun ^{lay} little
more than ~~on~~ its light and thermal emission/radiations, then ^{we} they
would not doubt the fact that the Sun ^{is a} - [star] is constant! (Change in
its luminous density does not exceed 20/o). But in other wave bands,
short-wave and long-wave, solar intensity periodically sharply
varies. And if the solar activity ^{was} they judged only by ultraviolet,
X-ray gamma-radiations or by radio frequency emission, then the Sun
would ~~render~~ ^{be a} /show the (star of variable)!

Page 16.



Comparative value of the sunspots and Earth (Earth is designated in small circle).



Violent protuberances. (to the right for a comparison is depicted the Earth).

Page 17.

The intensity of corpuscular radiation of the Sun also varies. From time to time ^{on} ~~for~~ the protective shield of the Earth - ^{the} atmosphere - ^{there arrives} ~~are brought down~~ much more powerful, than usually, corpuscular fluxes. As ~~the~~ ^{the} sign/criteria of the intensification of activity in the work of the Sun serves appearance on its surface of the so-called centers of the activity: ~~first here, then there~~ ^{and} near its equator ~~are~~ isolated bright area/sites ~~are the~~ photospheric faculae, which are ~~then~~ ^{they} ~~cover/coated then~~ ^{over} with dark points. Points increase, they increase ^{and sometimes} for the ~~extent/elongation~~ ^{clear up to then is speckled} of several days, but that also hours, ^{and} the ~~clear to that surface of the Sun is covered~~ by the spots of irregular form. The spots, inclined to be grouped in pairs, are ~~arrange/located~~ along both sides of solar equator. They continuously are modified and they move over solar surface, rotating together with the Sun ^{from} ~~with~~ west to the east.

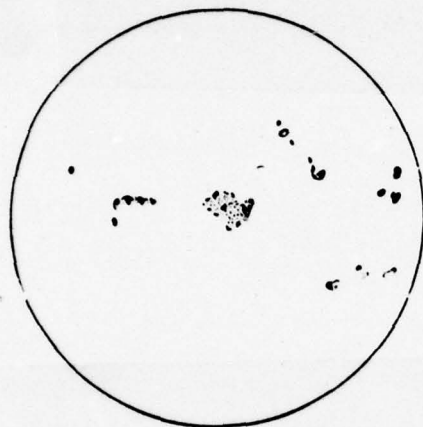
Separate spots and the groups of spots now and then reach enormous size/dimensions, occupying ^{an} ~~the~~ area, in which could be freely placed dozen terrestrial globes. The spot usually "it lives" ^{it lives, the larger it grows} from one day to several months (the longer ^{than it were}) and gradually comes to naught. It is ^{the} ~~simultaneous~~ with spots or shortly before that, ^{dot of the formerly} as these giant "freckles" ~~pour out on the pure/clean~~ ^{pour out} before face of the Sun, above its disk rocket upwards ^{as if the} ~~as if the~~

as it were,
languages of the raging flame^{of} igneous protuberances, and the relative stability of solar chromosphere is disrupted by giant explosions - chromospheric flares. At this time is amplified the solar wind^{and}, the continuous flow of gases, which goes from the Sun.

Of the numerous and variegated manifestations of the solar activity of ^{the} spot by the first ~~they~~ drew the attention of the observers even in the very distant times. The references to them are encountered in Chinese chronicles already in 301 years B.C. In their descriptions the Chinese compared spots first with hen egg, then with ^{duck egg} cleat/canard, peach, plum they noticed, that the years of spotting out usually follow in a row one another, and then begins ^{on} the inexplicable interruption in their appearance on several ~~summer~~/years and even decades. ^{There} The most valuable observations of the Chinese, clothed in somewhat a florid form, ^{reached the} send the ~~remainder~~ to Europeans only twenty one century later. But by this time scholarly Europe ^{had} itself ~~reveal~~/detected spots on solar surface.

Page 18.

Sunspots. (Galileo's figure).



(Spots very convenient object for investigation; ~~therefore~~^{such} their total area and number until recently they remain the criteria of solar activity). In the beginning the XVII century sunspots ~~are~~^{were} ~~discovered~~^{again} almost simultaneously and independently of each other immediately ^{by} (four: Dutchman Johann Goldschmidt, known by the name of Fabricius, Italians Galileo Galilei and Christoph Scheiner, and also Englishman Thomas Harriot. Following ^{this} ~~those~~ Galileo, and with ^{him} ~~it~~ simultaneously Fabricius and Scheiner established that full/total/~~complete~~ time of the inversion of spots and inversion of solar body around its axis, is equal to 27 days.

Hardly ^{had} (Fabricius printed his work, ^{than} ~~as~~ Galileo and Scheiner ^{they had} stated ~~about~~ the fact that ^{he had} ~~observed~~ the spots ^{before him} ~~even to it~~. ^{there began} ~~Was tied~~ the bitter dispute for the priority, aggravated moreover ^{by} ~~(interference~~ of church.

Priest and professor ^{of} ~~the~~ mathematicians, Scheiner, belonged to the order of the Jesuits, known ^{for their} ~~by a~~ strict discipline and blind adherence to Aristotle's ^{teaching} ~~study~~, according to whom the Sun completely is constant/~~invariable~~. During March 1611, when Scheiner reported spots to the ^{head} ~~chapter~~ of ^{the} ~~order~~, to ^{an} ~~ardent~~ peripatetic ^{follower of} ~~Aristotle's~~ follower, he heard as ~~answer~~^{response} prohibition to proclaim

"heresy" and the rebuke: "Read Aristotle's transactions from ^{Corr} panel to ^{Corr} panel, my son.

Page 19.

Spots most likely were in your telescope or in your eye". Only after Fabricius published ^{his} observations, to Scheiner they permitted to ^{do} make the same. It is significant, that, in every way possible contriving to preserve the "purity" of the ^{on} Sun ^{untarnished} "not not stained", Scheiner explained ^{the appearance of spots dark bodies or planets} spotting out by ~~passage before the disk of the~~ ^{passing in front of} heavenly body of dark bodies or planets.

Neither Galileo nor Fabricius shared Scheiner's opinion. They recognized that ^{the} spots ^{were} formations/educations on the very surface of the Sun, which rotate ^d together with it. Galileo thus demonstrated that the Sun rotates around its axis during ^{there arose a} period of approximately one lunar month. Was ^{this} tied the new dispute, which turned out to be fateful for Galileo. ~~its~~ caustic, sarcastic observations excited the hatred of the peripatetics, which consisted of Catholic clergy and Jesuits. In 1633 Galileo appeared before their law court on charge of heresy....

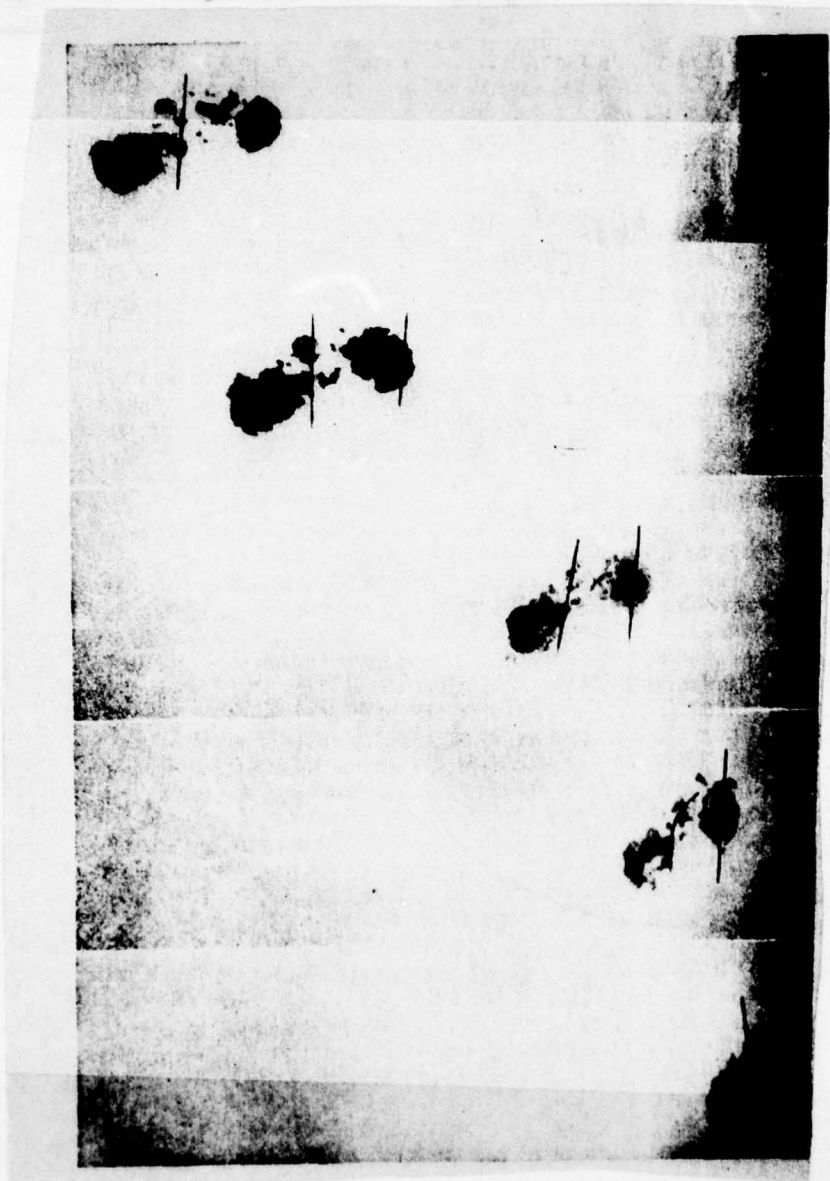
But nevertheless ^{what are} that such spot, these dark and comparatively cold formation/~~educations~~ on the surface of the Sun? ^{How we} is guessed

ⁱⁿ during our days their "great secret", ^{which} according to Galileo's
 expression, ^{for which} ~~above whom~~ ^{quite a few} ~~was beaten~~ little outstanding minds?
 Assumptions of the first observers, that ^{the} spot, ^{were} planet, the nearest
 satellites of the Sun, ^{was} ~~refuted~~ ^{by} Galileo. But also Galileo in turn,
 erred. He inclined ^{the} ~~was~~ to think that ^{were} spot - the clouds, floating in
 solar atmosphere. Some scientists asserted that these clouds are
 formed after the ^{eruption of} ~~ejection~~ solar is ^{volcanos} ~~vulcan~~, others accepted them as
 the apex/vertexes of mountains, that rose above ^{an} ~~the~~ island, lying on
^a solid solar nucleus. Outstanding English astronomer U. Herschel
 assumed that the spots are ~~time~~/temporary opening/apertures in the
 clouds, through which is seen the central core of the Sun. ^{His} ~~its~~ son,
 D. Herschel, considered them ^{to be} ~~the~~ immense eddy/vortices, descending
 through the atmosphere.

^{This argument was not ended in 2 day or two}
~~On spots argued not day and not two.~~ The problem of the origin
 of spots ^{was relayed} ~~by relay race transfer~~ converted from one generation of the
 astronomers to the following. ^{for a rather long time} ~~Sufficiently for long~~ popular remained
 the vortex conception of spots, ^{was popular} ~~According to this theory of~~ ^{the} spots -
^{were} ~~the~~ visible apex/vertexes of giant intra-solar eddy/vortices.

Page 20.

Five consecutive photographs of one and the same spot, which prove, that the spots rotate together with the Sun.



Page 21.

Vortex conception with all its plausibility did not explain, however, ^ato the characteristic and important distinctive special feature/peculiarity of the spots: their magnetic properties. (In 1908 Hale ^{real}revealed/detected that the spots possess ^athe magnetic field whose intensity/strength reaches 2000-4000 gauss, while the strength of overall magnetic pole of the Sun does not exceed one gauss).

It did remain incomprehensible, ^{exactly how}~~without doubt~~ do appear on the surface of the Sun the magnetic islands, ^{which are again}~~here newly~~ absorbed by igneous element? In accordance with the hypothesis of the Swedish physicists Alfvén and Valen, ^athe magnetic field of high strength is located in the nucleus of the Sun. Spots appear when explosion ^{will}~~will~~ ^{carries}~~carry~~ upward the "scraps" of this internal intense magnetic field. According to another hypothesis, they ^{are}~~are~~ the result of perturbation in the layer, which lies, under solar surface. ^{No matter how many}~~How much we not were~~ brought hypotheses, ^{we know} nevertheless they will not explain to us the nature of spots. Since the "great secret of spots", until now, ^{has not}~~yet~~ ^{been} guessed! On the nature of violent protuberances - this second essential index of the activity of the Sun - ^{also}the astronomers ^{did}~~did~~ guess ^{as}~~both for~~ long and ^{as}~~about~~ the nature of the spots: ^{perhaps}~~"It can be,~~ ^{it's}~~this mountain,~~ ^{or perhaps}~~and it can be,~~ solar clouds"? Only after the application/use of a photograph (in 1860) were for the first time

expressed the relatively probable judgments: ~~this the colossal~~ ^{ejected into} ejections of the rarefied solar material. They are discarded to the immense height, which reaches sometimes hundreds thousand of kilometers. For example, on 7 October, 1880, was observable protuberance ^{with} ~~by~~ height ^a 560 thous. km, 29 May of 1919 the protuberance, observed in Cambridge, it reached height ^a 760 thous. km. In Yerkes observatory they observed the protuberance, which achieved height ^a 831 thous. km. ^{If our globe were} ~~hit randomly terrestrial globe~~ ^{by} this eddy/vortex, on its surface everything instantly would perish in flame, and oceans and seas would boil ^{like} ~~as~~ drops of water, ^{falling into a} ~~which fell to the~~ incandescent frying pan.

The protuberances ^{are} ~~is accepted to~~ subdivide ^a into violent (eruptive), which strictly were considered ejections, and calm. The first are subjected to the very rapid changes: enormous igneous jets take off upward with ^a speed almost thousand times ~~of the~~ exceeding speed of artillery shell and immediately fall downward. Quiescent prominences sometimes for weeks at a time are twisted above one and the same place of solar surface without noticeable motion. In form they remind ^{us of} ~~the~~ clouds, the columns of smokes, gigantic trees with massive crowns.

Although they ^{high} ~~Being highly~~ rise ^{protuberances} above chromosphere, frequently to 150-200 thous. km, calm ^{all the same} do not reach the height of violent protuberances.

Between both groups of protuberances there is one additional essential difference. Quiescent prominences are encountered in all regions of the Sun, violent protuberances - only in the middle and equatorial regions, i.e., in the zone of sunspots and often near the spots, with which they, apparently, have close connection.

In the periods of solar maximums sharply changes the corona of the Sun. ^{At first} ~~to that~~ flattened and compressed, ^{it then becomes} ~~it is~~ straightened, ^{and} ~~(it~~ takes the rounded form. Its extent on all heliographic latitudes becomes approximately identical. The Sun ^{as if}, breathes ^{as it were}, ~~(by~~ ^{with} full/total/complete ^{chest} ~~breast~~. ^{when} Is reduced activity - corona again shrinks, becomes narrower, especially in the regions of poles. The "maximum" form of corona is inferior place to its "minimum" form. (Electronic condensation in the regions of corona, which are arrange/located above the centers of activity, ^{as} ~~usually is~~ twice as higher, ~~than~~ in calm).

Between the numerous phenomena of the solar activity: ~~by~~ spots, ^{an inherent} by flash/bursts, protuberances indisputably there is related ~~communication/connection~~. And although the "formula of relationship"

~~has not~~
yet derived, their diversity ~~it~~ cannot hide from the scientists of the remarkable unity of all solar manifestations. The two-faced deity ~~of the~~ ancient: - the Sun appears before us first serene, then agitated, ~~that~~ ^{then} ~~with two faces~~ ^{One} ~~have two persons,~~ ^{is} different from each other. ~~One~~ is the face clear, pure/clear, calm. Another spotty, lit up by "angry" chromospheric flares. And when "two-faced Janus" ^{reveals} ~~opens~~ slightly to us temporarily ~~his~~ ^{its} second face, then this means that the spectrum of the Sun becomes much harder, that grow/rises the intensity of the short-wave electromagnetic radiation of the Sun, that to the Earth are brought down the penetrating gusts of the solar wind, increases speed and is amplified the power of corpuscular fluxes, that the solar particles ^{have} ~~filled~~ whole near-earth space.

How frequently is changed the expression of solar face? This question have long already assigned to themselves the researchers, realizing well that for us, the inhabitants of the Earth, it has ~~not~~ ^{more than just} ~~only~~ theoretical interest.

Page 23.

A ripple on the waves.

"The unusual regularity of the behavior of the sun, writes in ^{his} ~~its~~ book "Our Sun" the director of Harvard observatory Donald H. Menzel, leads to the fact that we forget to focus on it considerable ^{is just as} attention. The sun both frequently is underestimated and ^{as the concern} ~~accurate~~ ^{of a faithful husband} ~~husband's care~~" ^{1.}

FOOTNOTE ¹ D. H. Menzel. Our Sun. Moscow, Fizmatgiz, 1963. END

FOOTNOTE

^{feel} ~~We felt ourselves as~~ ^{safe} ~~insured~~ from any unforeseen "tricks" on the ^{part of the Sun} ~~downwash~~ ^{being guaranteed for life its} ~~life provided by its even,~~ ^{care} invigorating concern. Meanwhile the history preserved the memory ^{of} ~~about the~~ surprising cases of the darkening of the sun, weakening of the solar radiation whose reasons

Thus
remain not entirely clear and until now. So, in the year of the death of Julius Caesar (101-44 years B.C.) the historians Plutarch and Dio Cassia noted that long time the sun remained faded, simultaneously was observed ^a the common/general/total cooling of the earth's atmosphere and the underdevelopment of fruits.

The darkening of the sun occurred into ^{years} 137 and in 360 years. It was noticed in all eastern provinces of roman empire. According to evidence of the historians of Prokopius and Kedren, in 526 year occurred a decrease and ^a the fogging in the sunlight. "The sun, writes Prokopius, ^{shine} it lost its flare, so that it resembled to the moon, and it remained without its radiant glow the whole year. For the most part it seemed ^{as in an} such, which it is during eclipse; its world/light was ^{as usual} not pure/clean and not such as ever".

^{the year}
In 567 year the darkening of the sun and simultaneously continuous aurora borealis lasted approximately one year. Mikhail Siritys's Armenian chronicle testifies that into 624 - 625 years "the sun darkened in autumn in the month of arecas to the summer of the month of Kagota and they thought that it ^{would} will not return to the previous state". Into the first eight months of the following ^{year} 626 year the half of solar disk still was darkened (according to Abul' Faragu). In the chronicle German physician Friedrich Schnurrer, ^{is made of} published in XVIII century, mentions herself the darkening of the sun

^{the year} into 733 years: ^A (Report/communication, undertaken, apparently, from some earlier source).

Page 24.

In 1645 obscure Russian bibliophile wrote: "Into the summer of 733 July during 12 days ... darkening Sun at midday...."

The sun ^{ceased its usual} glow ^{and acquired the} plot and into ~~unusual form~~ ^{realize} or form ^{at} the bottom of the ^a (boiler copper) sky to ^a cloud following ~~on~~ the sun ... not only in the city of Moscow, but also ^{our} in the entire country".

^{Reference here is not to an} But the question is not the eclipse of the sun. ^{An} Eclipse

really/actually occurred in 1645, but not during July, but only on 11 August. ^{Many such} Examples of such incomprehensible changes in the activity of the sun ^{have been} preserved in history ~~set~~.

What did occur with it in actuality? ^{the changes} Are ~~Random~~ or regular were described by the historians ~~of change~~? And can we generally judge the behavior of the sun in the past?

^{The} To sun ^{is} now approximately 4.5 - 6 billion ~~summer~~ ^{old} years. To Earth ^{as of all} ~~so many~~. Life on ^{the} planet, apparently, conceived itself about 3 billion years ago. Original people appeared about 1.5 million years ago, and ^{reasoning} "person reasonable" exists altogether only 25 thous. ~~summer~~ years.

Observations of solar surface, as has already been ^{said} spoken, they were begun even into the ancient centuries of the history of humanity, but this were the interrupted/fragmentary, separate observations. ^{Yet we have} ~~To us send the remainder~~ literally single evidence about the activity of the sun in the past.

The systematic observations of solar surface, initiated with Galileo, ^{have been} ~~are~~ conducted a little more than 300 summer/years. The precise measurements of the visible radiation of the sun are conducted ^{only} ~~in all~~ some thirty summer/years, but other forms of emission/radiation ^{even} ~~and that~~ are less ! Is created impression, that ~~the~~ science does not have data ~~in order~~ to judge the past of our star. Any attempt to mentally recreate the yesterday of the sun is unavoidably connected with the representation of such intervals of time, which are almost incommensurable not only on the lifetime of man, but ^{of} entire humanity whose experiment ^{even} ~~and~~ memory are capable of encompassing only ^{the} ~~the~~ instants of infinitely long life of Sun.... And ^{nevertheless} ~~all the same~~ audacious human thought attempts to glance into the bottomless precipice of departed summer/years.

The Earth is flesh from the flesh of the sun. Thus already more than 4 billion summer/years they inseparable ^{by how el through} ~~travel~~ on the universe.

The Sun and Earth have experienced much
~~Much it was necessary to survive Solntsa and Zenle~~ on galactic
rotations. And ~~if~~ ^{whereas} on the incessantly changing face of star time could
not leave any traces, then perturbation in the activity of the sun
were reflected in the appearance of its ~~accurate~~ ^{faithful} companion. First
there, then here science ~~it~~ finds and ~~it~~ deciphers the autographs,
left there ^{at one} ~~is~~ no time on the face of planet by solar ray/beam.

Page 25.

Restoring the picture of the distant past of the Earth, the
geologists, the paleoclimatologists, the geophysicists they recreate,
after discarding the film of ~~summer/years~~, the features of its
previous appearance, repeatedly of that changing to
unrecognizability. The chief characteristic of the development of our
planet proves to be the occurrence of cycles: the Earth periodically
was impregnated with water, ~~as if jaw~~ ^{just like a sponge}, then it dried, then it was
cover/coated with glacial armor. On the nonuniformity of geological
stratification, on variations in the annual precipitation on the
ocean floor, on breaches, opened in rock ~~species~~ ^{by} the mighty breast
of glaciers, the science attempts to restore/~~reduce~~ the curve of
solar pulse in the distant past.

Occurrence of cycles in the development of the Earth is an
indication of occurrence of cycles in the activity of the sun itself.

Both now and in the past, similar to many phenomena of nature, the activity of the sun occur/flow/lasted, apparently, cyclically, although we do not know, but we can only guess, which laws controlled and control hot solar respiration. ^{why are there} ~~Why do occur~~ the years, when on glaring disk ~~do~~ appear and ~~do~~ disappear large spots, ^{while} ~~when~~ the "radio service of the sun" ~~does~~ record¹ intense radio frequency emission, and on the contrary, ^{why there} ~~are the~~ years, when the most attentive observer does not find on the sun even of small points?

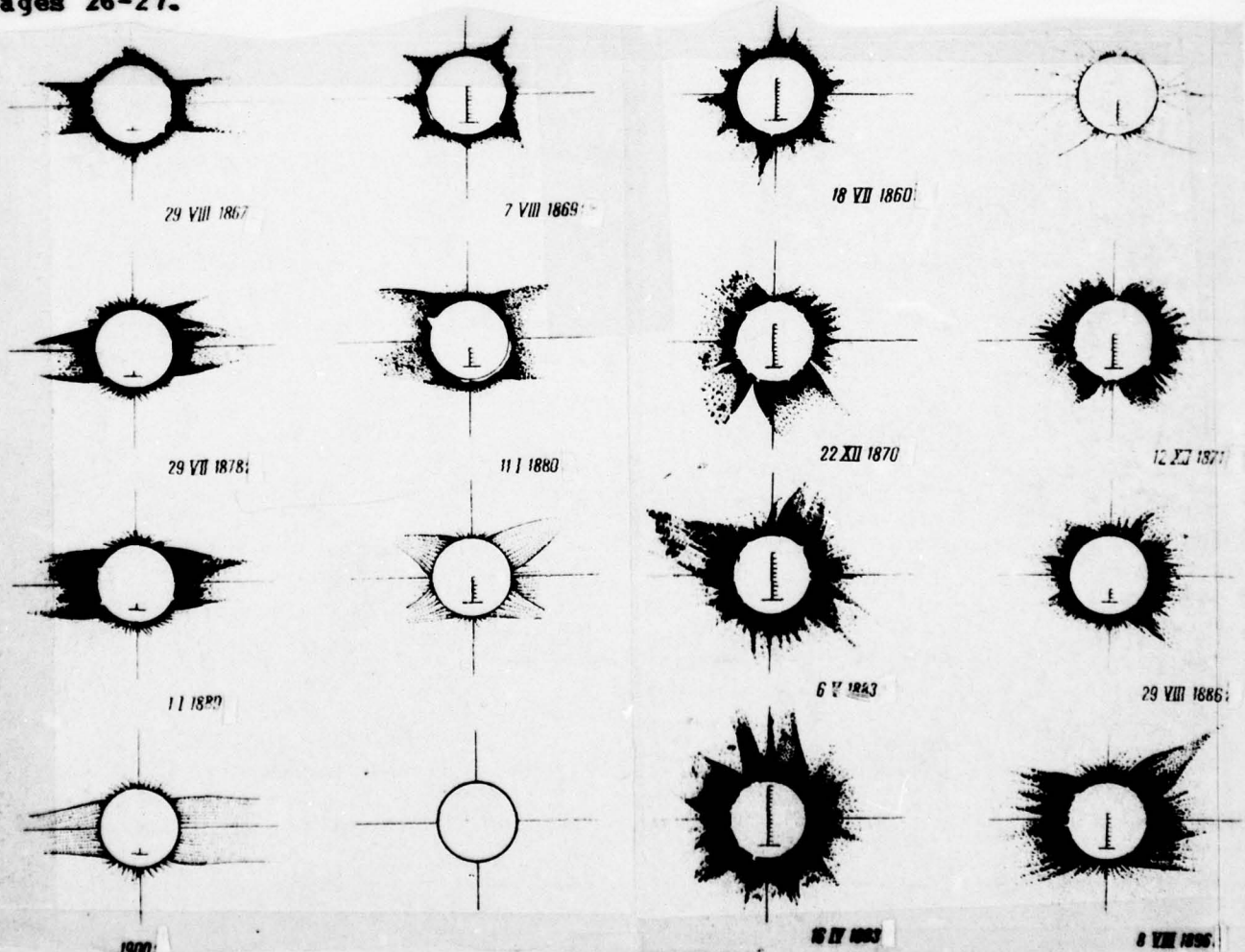
Why the activity of the sun little by little ~~does~~ grow² gradually it does reach the maximum and then does weaken? How do appear the following after each other solar cycles?

The law of periodicity "in the work of the sun" was ^{discovered} opened in the past century by the canon Heinrich Schwabe from Dessau. ^{with} ~~Disposing~~ ^{of} small, modest telescope, Schwabe systematically for 43 ~~summes~~/years daily ~~it~~ recorded the location of sunspots. And because of phenomenal purposefulness he knew how to notice that the fact that ^{missed} ~~slipped off from~~ the attention of the less scrupulous observers: changes in the number of sunspots begin periodically.

Following canon Schwabe the systematization of observations of

oscillation/vibrations in the manifestations of solar activity
 was by studied astronomer from Bern Rudolf Wolf. He gathered, verified and generalized the not published and unpublished previously materials of the different observers of the sun. After processing these data, he it establish/install the landmarks of solar activity, its maximums and the minimums, beginning with 1610, and derived a precise period of spot formation.

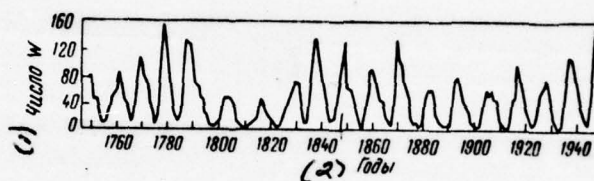
Pages 26-27.



Changes in the form of solar corona for the extent/elongation of 11-sunser solar cycle (according to A. P. Ganskiy).

Page 28.

Graph, which illustrates rhythmic of solar cycles. ^{Key} 1. Number W. 2. Years.



Works of Wolf ^{Wolfer} continued after his death by Wolfer, led to the conclusion/derivation that the basic, most distinctly expressed period of solar activity was equal on the average 11 to years. (Deviations - a decrease or an increase in this period reach several summer/years). Later they were, furthermore, were described dozen² ~~of~~ other cycles whose value varied from months to millions of summer/years. Therefore more precise the activity of the sun one should call/~~name~~ not simply "cyclic", but "multicyclic".

If we depict solar activity in the form of ^a curve, ^{then} after designating on the axis of abscissas time, and on the axis of ordinates - the level of activity, then the obtained curve will resemble not ~~to~~ sinusoid as it ^{we might} ~~was possible to~~ expect, but will turn out to be compound curve, pitted by large number everything smaller waves.

With the high degree of authenticity the epochs of the activity of the sun can be judged also from data of a series of the astronomers. D. I. Svyatskiy, being based on large historical material, composed a table of the epochs of solar maximums ^{from the} ~~with~~ ^{to} ~~the~~ XVII century of our era. The degree of the probability of each date was determined by the totality of serious large historical material. If we attentively examine 49 intervals of this table, it will seem that in spite of large deviations from 11-summer period, intervals ^{of} ~~to~~

11-12 ~~summer~~^{of}/years they are encountered 11 times, into 7-8
~~summer~~^{of}/years - 12 times, into 13-15 ~~summer~~^{of}/years - 7 times and into
 5-6 ~~summer~~^{of}/years - 3 times. Interval into 20 ~~summer~~^{of}/years ~~divides~~^{share} two
 maximums ~~altogether~~^{of} only one time. Arithmetic mean of all 49
 intervals is equal to 11 years. The points of maximums in curve
 are located one from another not at equal distances, the height of
 the ordinates of different maximums is different. From this and a
~~series~~^{number} of other special feature/peculiarities of the curves of solar
 activity, it follows that value determination of period - ~~matter~~ is
 a complex matter.

Page 29.

More evidence of this is
~~On the same testifies~~ the contradiction in the judgments of the
 numerous and conscientious researchers of this question. They
 obtained the different values of time interval between the maximums:
 10 ~~summer~~/years (Swabian), 10.43 years (Lamont), 11, with the ~~middle~~^{mean}
 variability plus or minus 2 years (Worlf), 12-14 ~~summer~~/years
 (Young), 11.124 plus or minus 0.03 years (Wolfer), 11.13 years
 (Newcomb), above 11.4 (Michaelson), 11.4 years (Turner).

numerical data
 Chester in the works of 1898-1906 subjected to analysis ~~essay~~
~~on~~ about spots ~~in~~^{over} 150 ~~summer~~/years. According to his studies next to
 cycle into 11.25 years ~~goes the~~^{is a} series of the secondary periods -

4.38, 8.36, 13.5 ~~summer~~^{about}/years, consecutive entrance of which is the reason for the different disturbance ~~breakdowns~~^{breakdowns}, observed in the main period.

The basic cycle of solar activity only approximately is 11 ~~summer~~/years. In actuality, its duration reaches sometimes 16, and sometimes 17 ~~summer~~/years. The ripening of maximum, its duration and decline are not measured by the determined periods, but every time they vary, as a result of thus far also unknown reasons. Therefore with the establishment ⁱⁿ and the fact it is ^{even more in attempts to predict} more the attempts to predict the state of the sun, at some point of the period extreme discretion is necessary. Sudden changes in the activity of the sun ← which signify by itself the point of highest uplift and smallest incidence/drop, can be named with accuracy only ^{after} through several months, but ^{and} sometimes also years ^{later} after ^{by} comparison with data of solar activity ^{on} in ^{for a} are more or less prolonged period.

^{of a} Besides the 11-year cycle Wolf allowed for the existence 22-23-year occurrence of cycles in the work of the sun. In the opinion of Turner, two 11.5-~~summer~~^{year}-cycles, store/adding up, give one

^{year} 23-~~summer~~ cycle.

Investigating the signs of magnetic polarity of 2000 groups of spots from 1908 through 1926, Hale and his coworkers discovered that with the

transition from one 11-year cycle to another groups change (with a few exceptions/elimination) the signs of magnetic polarity. Thus, the magnetic characteristics of two neighboring 11-~~summer~~^{year} cycles are not similar to each other and seemingly they confirm that it is more ^{correct} right to measure the period of solar activity ^{for} twenty two

years instead of eleven. 22-^{year}~~summer~~ period completely can be call/~~named~~ the "magnetic period" of sunspots.

Page 30.

After were reveal/~~detected~~^{ed} 22-summer, 11-summer and even shorter cycles in the activity of the sun, logically were begun the searches for large periods.

In one hundred more summer/years before observations^{of} Swabian^e ^a/₂ noted French physicist, astronomer, ^{and} the mathematician de Meran ~~allow~~/assumed the possibility of the existence of large periods in solar activity. Attempting to find this long period, Worlf ~~it~~^{is} determined ^{at} his duration in 55.5 years, others ~~into~~^{of} 60 summer/years (Young), ^{at} in 72 years (A. Ganskiy), 35 summer/years (Lockier), 33.37 years - the "Cycles of the Third of Century" (Schuster and Litsnar).

In 1889 Worlf on the basis of these Chinese and medieval chronicles calculated a series of ~~the~~ large periods, including 11-^{year}~~summer~~ periods, ^{of} into 83.33 and 66.67 years ¹.

FOOTNOTE ¹ To calculate large periods Wolf used dates which could be dates of the "large" maxima in solar activity: 372, 840, 1078, 1133,

and 1373. He based this on the years of 372 and 1372, in which according to his hypothesis, there was particularly strong solar activity. END FOOTNOTE

These periods were compared by Wolf with dates from Chinese, Russian, West European and Armenian sources. As a result was obtained extremely interesting table. Everything in it speaks for the fact that the maximum of the activity of the sun is repeated approximately through every 83.33 years.

We have every reason to believe
"Are all foundations for considering that the hierarchy of cycles of solar activity does not ~~conclude on~~ *end with the last* cycle with duration into 80-90 summer/years" ², writes B. M. Rubashev in the book "Problems of solar activity".

FOOTNOTE ² B. M. Rubashev. Problems of solar activity. Moscow-Leningrad, "Nauka", 1964. END FOOTNOTE

Then So, into 1954 arose assumption about the existence of period *of* into 169 summer/years (Anderson) and *of* into 180 summer/years, including fifteen *year* 11-summer cycles (Oppenheim). On the basis of the analysis of data on

the frequency of the aurora borealis of German scholarly Fritz was revealed 300-^{year}~~summer~~ cycle (Claff).

Is ^{is} Very curious the law, noticed by the Soviet astronomer A. I. Olen. After connecting by straight lines on the curve/graph of the point of maximums and minimums of the 80-summer cycles of the XVIII-XIX centuries, ^{he} it obtained two the parallel lines, having ^{slight slant} ~~cooking~~ toward the axis of abscissas, and thus ^{he} it demonstrated ^{the} centuries-old increase in the solar activity !

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B. M. Rubashev used the catalog of comets, comprised by Denning, where were introduced information for nineteen centuries (beginning from I centuries ⁴ A.D.). After processing it, ^{he} it was convinced of the fact that ^{most} a greatest quantity of comets appears regularly through ^{every} ~~each~~ 600 and even of 900 ^{year}~~summer~~/years, ^{and he} it obtained the indirect proof of the existence of 900-^{year}~~summer~~ cycle.

Nonuniformity in the thickness of the growth rings of wood allowed geophysicist professor I. V. Maximov to reveal/detect not only 80- ^{year}~~summer~~, but also 600-^{year}~~summer~~ cycles.

To ^{probe} ~~grope~~ the cycles of an even larger duration ^{are useful} ~~help~~ the facts,

^{extracted}
~~"pulled out"~~ by science ^{from very} ~~of entirely~~ grey antiquity. The traces of glaciers "described" to Soviet researcher A. V. Shnitnikov the cycles of solar activity, equal to 1800 ^{years} A. Villet and P. P. Predtechenskiy on the basis of paleoclimatological data, and also on the basis of the hypothetical cycle of the oscillation ^S vibrations of solar luminous density, prove ^d that there are cycles ^{lasting} by duration into millions of ~~summer~~/years...

Thus, ^{on} to the large crests of the waves of activity ^{are imposed} ~~is deposited~~ ^{the} ~~fipple~~ ^d ~~smaller~~ ^(waves)! Are found two-, three-, four- and six-year old cycles. Are well-known 11-^{year} ~~summer~~ cycles. Are clearly expressed cycles ^{of} into 22, 33 and 80 ~~summer~~/years. It is not possible to discount 169, 400 and the 600-^{year} ~~summer~~ and more prolonged cycles, which seem ^{to} ~~(us by~~ so/^{but which constitute} such long ~~the components~~ in the life of star only ^{an} instant.

The question concerning periodicalness in the activity of the sun, as is evident, it is not ^{solved easily} ~~permitted simply~~ ^{Moreover} ~~It is not solved~~ still finally, ^{we need} ~~also, prior~~ to this day. ^a ~~Is necessary~~ the combination of prolonged observations and enormous efforts of human thought in order to approach ^{the} ~~itself its~~ resolution.

^{what are}
 But ~~are such~~ the reasons, which force the sun from time to time to change ^{the} character and ~~mode~~ conditions of their activity? They also thus far are unclear. In order not to ^{depart from} ~~leave to the side from~~ the

basic theme, we will not begin to give the existing on this account numerous hypotheses and guesses. It is important in order that the reader would note for himself ^{the} fact of the existence of nonuniformity in the work of the sun.

Subsequently from many small, larger and extremely more prolonged cycles we will interest in ^{basically the} essence ^{year cycle} 11-sun ~~the~~ most pronounced and "demonstrative" cycle in the activity of the sun, most obvious for an observer. Although it is subjected to variations as all others, its existence ^{is most} ~~more~~ difficult ^{of all} ~~anything~~ to deny. Specifically, ^{use it} it we will take in order to illustrate the possibility of the fact that in the apparent randomness of terrestrial cataclysms ^{there} they hide themselves, perhaps, strict space laws.

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Solar fever on the Earth.

Without doubt agitations and storms on the sun do affect the planet? Does ~~continue~~ ^{Continue} our spacecraft the "Earth" ^{to} quietly and serenely ~~swim~~ ^{navigate} by its course or ~~it all the same~~ ^{is it} "does ~~rock~~ ^{rocked}" on the waves of cycles of solar activity so that from time to time "is audible the ringing of beakers in ~~cabin-campaign~~ ^(ward-room)"2.

The witty tone of question does not diminish its importance. Despite the fact that ~~communication~~ ^{according to} /connections between solar and terrestrial phenomena, ~~on~~ ^{as} one French journalist's ingenious observation, ~~so/such~~ ^a are ~~complex~~ and tangled as relations between two heroes in ^a contemporary psychological novel, ~~the~~ contemporary science ~~on~~ ^{does not} doubts their validity.

The Earth as has already been ~~spoken~~ ^{said}, ~~it~~ is located in the sphere of the direct effect of the sun. Its radiant energy is the main engine of all physicochemical processes, which take place on the

surface of ^{the} planet and its shells. It is understandable that each ^{burst} takeoff of solar activity with echo rolls over all "terrestrial ^{steps} ~~floor/stages~~". The mighty intermittent respiration of the sun incessantly agitates the stability of terrestrial magnetic field, it disrupts the stability of its encircling radiation belts, it agitates ^{the atmosphere extending} that which ~~was stretched out~~ to hundreds thousand kilometers around the Earth atmosphere, it is transferred to hydrosphere, to the surface layers of lithosphere, it manifests itself even ⁱⁿ the velocity of the rotation of the Earth. If we ^{make a} complete mental descent from upper air to the rigid surface of the Earth, stepping ^{down the} over on layers -- ~~to~~ the exosphere, ~~to~~ the troposphere, as on step/stages, then at each step/stage without fail ^{there} ~~they~~ will be reveal/^{ed} ~~detected~~ the numerous manifestations of sun-earth unity, which show that ^{we can} ~~us~~ with the sun ^{show} ~~divides~~ only ^{on} ~~the~~ imaginary boundary.

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Cosmos brings down to the earth ⁹ the continuous flow of the atomic nuclei, which fly at enormous velocities - cosmic rays. The intensity of space "bombardment" first is amplified, then it weakens, which is reflected in the state of the earth's atmosphere: pressure, temperature, ionization, conductivity. In the fluctuations of the intensity of cosmic radiation are reveal/^{ed} ~~detected~~ clearly expressed the 27-day and 11-sunmer periodicities, caused by the sun. Cosmic

radiation ^{presents itself as a} comes forward ^{of} its kind as the conductor of the rhythmic effect of the sun on atmosphere. ^{to the}

^{the 'earth's' magnetic field, caught in the}
~~Stopped up into~~ solar jaws ~~the magnetic field of the Earth~~ also receives and reproduces the rhythm of solar processes. The passage of the sunspots through ^{over} the central meridian of the sun, the appearance of powerful chromospheric flares will entail immediately, ^{within} through one-two days, the powerful shocks of terrestrial magnetic field - authentic magnetic storms. This dependence so is intimate and so clearly is outlined, that the indices of the magnetic field of the Earth now are utilized for determining solar activity. The ^{perturbation} confusion of magnetic field is repeated regularly, ~~after~~ agreeing with the 27-day period of the rotation of sunspots. The perturbation of magnetic field ^{reveals} detects furthermore clear 11-^{year} ~~summer~~ fluctuations. In the magnetic activity of the Earth are reflected ~~the~~ more prolonged cycles of the activity of the sun.

^{Increases} ~~To~~ ^{reflected in} uplifts and decreases in the solar activity ^{are} immediately respond the upper air, in particular ionosphere. The sun changes the degree of ionization of atmosphere and thereby it affects its electrical conductivity, the density, the ability to reflect radio waves. The consequence of solar perturbation therefore frequently are the disorders of distant radio communication. On 9 May, 1959, in 1 hour ~~of~~ 3 minutes on Moscow time on solar disk appeared enormous

flash/burst. ^{On} 10 and on 11 May ^{there} followed still several flash/bursts. On 11 May in the USA ^{there was a breakdown in} left the system of radio, telegraph, telephone. ^A Day later, on 12 May, ^{receiving} when to the earth ~~was brought down~~ the main flow of charged particles, in sky glowed bright aurora borealis.

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^{vacillation}
"Without ~~fluctuations~~ it is possible to say that the mode/conditions of the upper layers of the earth's atmosphere is determined by solar activity, writes B. M. Rubashev. - Whether we are talking about the state of ionosphere, various kinds the brightness of the upper layers (aurora, night glow) or about the state of geomagnetic field - everywhere is necessary to bear in mind solar radiation" ¹.

FOOTNOTE ¹ B. M. Rubashev. Problems of solar activity.

Moscow-Leningrad, Izdatel'stvo "Nauka", 1964. END FOOTNOTE

Solar storms agitate not only upper air. Their echoes reach ^{to} lower layers, ~~into~~ the troposphere. In the history of the investigation of sun-earth ~~communication~~/connections the problem ^{is} ~~the~~ "sun ~~is~~ ^{is} the troposphere" ¹⁵ one of the oldest. Already from the

torque/moment of discovery/opening^g sunspots some researchers began to connect climate variations in some regions of the Earth with solar activity. ^{A rapid} The ~~fugitive~~ enumeration of scientific investigations, dedicated ~~the only~~ ^{alone} to this problem, would engage ten pages. Nevertheless there is no full/total/complete clarity thus far ~~still~~.

Soviet geophysicist I. V. Maximov and its students approached completely in a new way the resolution of this complex problem. They decided initially to investigate ~~communication~~/connection of solar activity with the common/general/total circulation of the earth's atmosphere, and then with hydrometeorologic processes.

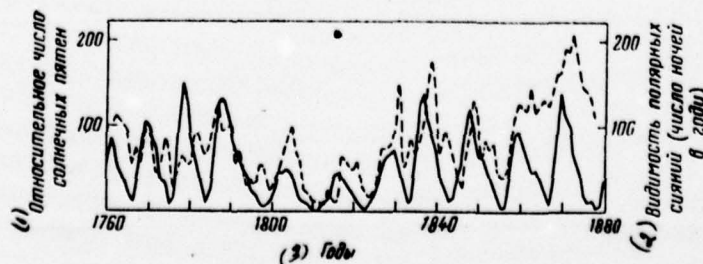
It turned out that all brightest cycles of the solar activity: separate ~~flash~~/bursts, 27-day, variations, 11-^{year}~~summer~~ and secular cycles - create ^{Corresponding} ~~the appropriate~~ changes in atmosphere circulation. But general circulation transforms solar "jerk/impulses" into the occurrence of cycles of ~~the~~ fluctuations of ~~the~~ temperature of air (warming of the arctic, the nonuniformity of precipitation, the regular frequency of typhoons, hurricanes, thunderstorm). It is possible that ^a ~~the~~ fundamentally new approach for the solution to this problem will turn out to be promising. "The physically correct statement of old problem, noted in one of his articles ^{of the} known Soviet heliophysics M. S. Eygenson, it is at the same time the ^{greatest} largest scientific news" 2.

FOOTNOTE 2 M. S. Eygenson. Notes on the physico-geographical manifestations of solar activity. Lvov, 1957. END FOOTNOTE

The atmosphere, which ~~we~~ is conditionally ^{divide into} divisible to layers, is physically single. It is natural that the disturbance/perturbations, which invade ^{step} to it from without, are transferred from its one "floor/stage" ^{to} on another, producing ^{interrelated} coupled effects. The effect of solar activity not simply "slightly it interferes upper air", but it penetrates depthward, it reaches the very floor of air ocean - atmospheric boundary layers. The ^{shift} exchange of meteorological conditions on the Earth under the effect of solar activity in turn, is reflected in geophysical processes.

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Graphic representation of ~~communication~~/connection between the frequency of aurora (dotted line) and the number of sunspots (per Tromholt). ^{Key} 1. The relative number of sunspots. 2. Visibility of aurora (number of nights in year). 3. Years.



A. V. Shnitnikov noted the existence of the caused by the sun variations in changes in altitude^{height} of the level of Scandinavian lakes. Many researchers reveal/detect communication/connection of solar activity with the fluctuationsⁱⁿ of the level of Caspian Region, with the nonuniformity of the runoff of rivers.

The boundless mirror smooth surface of ocean, which occupies about 70o/o of entire surface of planet, also in its own way reacts to the whims of solar weather. The Soviet researchers I. V. Maximov and his students, ^{and before} but to them to Yu. Yu. Vize, demonstrated that the ^{most diverse} different indices of ocean change in accordance with solar indices. With the 11-^{year} ~~summer~~ and secular cycles of solar activity are connected the degree of the icy state of the arctic seas and northern Atlantic, fluctuation of the level of ocean, the pulsation of gulf stream, the thermal mode of Norwegian and Barents Sea, etc. The effect of solar activity on the hydrosphere of the Earth just as ^{surely as} ~~is indisputable as~~ its effect on atmosphere.

Rhythmics of solar activity is reflected also in the indices of geophysical processes. A series of the researchers they assert that the maximum values of energy of earthquakes fall ^{within} on the years of the maximums of the solar activity, and minimum ^{within} - for the years of the

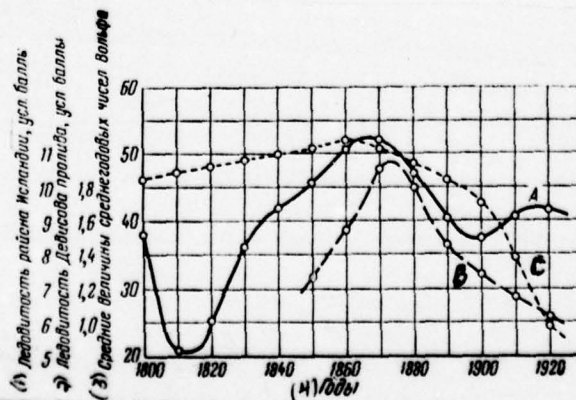
minimums. Catastrophical earthquakes and volcanic eruptions also they occur into the years of uplifts of solar activity (ejection of the volcano of Krakatoa into 1883, the catastrophical earthquake of 1920 in China, the earthquake of 1966 in Tashkent).

I. V. Maximov reveal/~~detected~~^{el} distinct 11-summer occurrence of cycles in the motion of the poles of the Earth.

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Comparison of average annual Wolf numbers ¹ (A) with oscillations of the icy state of the Davis straits (B) and of the adjacent to Iceland region of Atlantic Ocean (C) (according to I. V. Maximov). ^{Key:} 1. Icy state of the regions of Iceland, arbit. units. 2. Icy state of the Davis Straits, arbit. units. 3. The average values of Worlf's average annual numbers. 4. Years.

FOOTNOTE ¹ The Wolf number - ω - is a value that characterizes solar activity. END FOOTNOTE



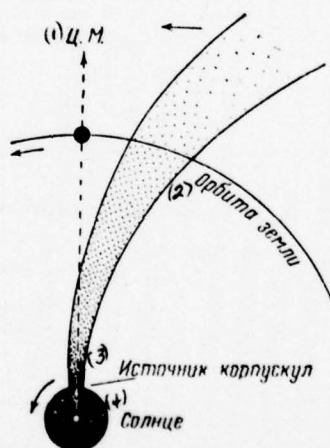
The rhythm of solar activity accelerates and retards (true, very insignificantly) the velocity of the rotation of the Earth. The French geophysicist Danjon comes to the conclusion that the "mode/conditions of the rotation" of our planet can change as a result of very powerful ~~flash~~ bursts on the sun. Thus, ~~entire~~/all (available to study inanimate nature), all terrestrial shells from the upper layers of the earth's atmosphere to lower boundaries of lithosphere reproduce in their own way the rhythm of the sun.

The sun fluctuates, and the beat of the pulse of our daytime star is transferred to the Earth. With it ^{time} ~~into cycle/stroke~~ is changed the strength of terrestrial magnetism, the frequency of aurora, the radioactivity of air, the degree of ionization of upper air, change of the radio reception and audibility, the strength of atmospheric electricity, ^{the} atmosphere circulation, the intensity of thunderstorm activity, ~~a~~ quantity of ozone and of cosmic dust in air, the temperature of air, water of seas and oceans, air pressure, the frequency of storms, hurricanes, waters-spout, amount of precipitation, the degree and the abundance of droughts, the level of lakes, climate variation and earthquakes.... Moreover, is ^{and} reveal/~~detected~~ even communication/connection between the pulsations of the earth's crust and the solar activity. The Earth in the direct/~~straight~~ sense of word breathes in the rhythm ^{with} of the sun. "The sovereign of all elements" ^{makes its appearance} ~~comes forward it~~ in terrestrial life. But

this is understandable: radiant solar heat, as we know, is the basic source of energy of the majority of the physicochemical phenomena, which occur in all shells of planet.

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Zone of the active region of the sun (~~is~~ shaded) periodically "illuminates" the Earth ^{like an} enormous projector (according to E. R. Mustelyu). ^{Key:} 1. C. n. 2. Orbit of the earth/ground. 3. Source of corpuscles. 4. Sun.



Until now, we spoke about how changes in the activity of the sun they manifest themselves the inanimate nature. Well, and ~~do manifest themselves~~ ^{do} solar rhythms ^{affect} the state of biosphere and the current of the life, which exists within its limits?

We know that the sun is a source of terrestrial life. Life conceived itself, evolved, became adorned with thousands of hues only because of the life-giving force of the sun. Do ~~react~~ people, the plants, animal^s, microorganisms - whole "living substance" of planet (determination of V. I. Vernadskiy) - ^{react} to solar storms and the produced by them shocks in entire ^{medium} surrounding life to the ~~medium~~? It is difficult to allow ^{the} thought that the life stands outside the laws, which are so ~~such~~ distinctly exhibited in the inanimate nature, ^{from} with which it composes authentic and indissoluble unity.

The
New or the forgotten old?

Geophysicists, meteorologists, climatologists, oceanologists - ^{all} ~~everything~~ those, who are participating ⁱⁿ to the science of the Earth, do not doubt the validity of sun-earth ~~communication~~/connections. But by no means all the biologists and the physicians share persuasion in the fact that the cyclic activity of the sun affects biosphere and

the course of life in it. Although no one of them disputes, that ^{it is} precisely to the sun ^{which is responsible for} ~~is due the~~ life by its origin/conception/initiation, the ^{idea} ~~thought~~ about the fact that it continues to ^{interfere} ~~be add/interfered in the matter of the~~ "hands of its", produces frequently ironic smile.

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^{of an} Idea ~~about the~~ intimate dependence between the activity of the sun and the state of biosphere is estimated frequently as "the fantasy of ^{individual} ~~separate~~ too hot heads" as very doubtful innovation. Is ~~justified~~ ^{Such} similar skepticism ^{justified}?

In biology had long ago been affirmed the understanding of the fact that ^{an} ~~the~~ enormous role in development ^{of everything} ~~entire~~ living belongs to environment. Contemporary materialist natural science, overcoming the inertia of geocentric thinking, widely ^{expanded} ~~moved~~ ^{the outer space} ~~near~~ this concept, rightfully ~~after~~ extending it to ~~surrounding the Earth the outer space~~, saturated by completely material electromagnetic radiations and the powerful flows of the driving particles. Since material consists, ^{according to} regarding the twice Nobel prize winner chemist Linus Pauling, of substance and emission/radiations.

With this understanding of environment the sun must be

considered ~~by~~ one of its principal factors. It would seem, difficult to object to similar logic; however, many, until now, associate heliobiology with something like astrology or "black magic".

In connection with this is interesting the instructive case with encephalitis. Word "encephalitis" in physician's language indicates the inflammation of brain. ^{It implies} ~~Hearth by it is implied~~ not some disease, ^a but the vast group of cerebral illness/sickness/diseases. In our ^{tick-borne} country sadly became famous spring-summer ~~forceps~~ virus encephalitis.

In the period of the wide mastery/adoption of the Far East in the thirties on new constructions, lumbering enterprises, in taiga settlements flared up the heavy epidemic of unknown origin. Illness/sickness/disease striked ^{basically} ~~in essence~~ of the migrants, its ^{course was} ~~occur/flew/lasted~~ acutely and either killed patient or it left after itself irreparable, life mutilations. ^{for life} ~~an~~ For the explanation of the nature of disease into epidemic foci were sent for exploration scientific research biomedical expeditions. The names of the participants of these expeditions: L. I. Zil'bera, M. P. Chumakova, A. A. Smorodintseva, I. I. Rogozin et al. ^{were} ~~by~~ subsequently learned ~~entire/all~~ country. Many of the participants of the first epidemiological taiga onslaughts paid ^{to establish} ~~by~~ health, and some even by life before it was possible ~~establishing~~ that in the taiga rages one ^{blood-sucking Taiga ticks} of the varieties of virus encephalitis and that they transfer exciter

from wood animals to people, ~~the blood-sucking taiga mites/tongs~~

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^{the} Virus, without causing harm ^{to} neither musk deer nor moose/elk nor
^{rabbit} Manchurian ^{host} protein-- the basic "provider" of ^{ticks} mites/tongs, in man
often produces the irreversible damages of the nervous system. ^{Refer} To the
^{outbreak} flash/burst of epidemic in the Far East the ^{ticks} mites/tongs did not
produce suspicions ⁱⁿ of parasitologists. No one assumed that they can
be the carriers of dangerous virus.

^{long period}
Since then ~~pass~~ 30 ~~summer~~/years. For this time tick-borne
encephalitis, its exciter, the carriers of virus, way of the
propagation of illness/sickness/disease were thoroughly studied and
they entered in all textbooks.

On this basis, medicine worked out an entire system of measures for
prevention of the disease. But strange as it may seem, despite all the
measures undertaken, encephalitis was not disappeared.

← Epidemic of this disease from time to
time again flashes, appearing with surprising regularity,
approximately ^{every} through each of 10-11 ~~summer~~/years, being spread from
^{the} "epicenter" to enormous distances. Exactly ^a decades later after the
described case the virus of encephalitis suddenly appeared in the
European part of the country and in Omsk region. ^{One decade} ~~an additional~~
^{later} ~~decades after~~ it ^{was} reveal/detected in such, it would seem,
inappropriate places as India, Canada, Malaya. In India from
encephalitis, besides people, suffered the monkeys. During epidemic
the whole ^{bands} herds of animals perished ^{within} after several days. The

^{out breaks}
~~flash/bursts~~ of epidemic as has already been spoken, ^{were} divided
^{by} ~~interval~~ ^{of} ~~gaps~~ into ten-eleven ~~summer~~/years. With each new wave the
character of ^{the} ~~illness/sickness/disease~~ was modified to such an extent,
that at the first ~~torque/moment~~ the physicians even immediately did
not distinguish already familiar infection, thus far laboratory
checkings ^{have} ~~did~~ not establish ^{ed} ~~install~~ the nature of exciter.

^{The} ~~the~~ (Strange transformation of illness/sickness/disease, and, ^{primarily} ~~main~~,
^{Also} ~~Strange, incomprehensible periodicity !~~ ^{hiny were} ~~Astonished~~ other inexplicable
^{outbreak} agreements. So, shortly before the last ^{there was an} ~~latter~~ serious flash/burst of
the epidemic of 1957 in littoral ^{of} ~~in~~ avalanche it gushed out the
^{squirrels} ~~protein~~: for one year, preceding epidemic, ~~squirrel sandpapers it was~~
^{squirrel furs were prepared} ~~prepared~~ 250 times more ^{ed by} ~~than~~ for three following years. Little beasts
^{came in waves} ~~went by~~ ^{ed by} ~~avalanche~~, as if movable with some indomitable force. They
moved ceaselessly, approximately at a rate of thirty kilometers in a
24 hour period, swam across rivers, they went even in villages, they
ⁱⁿ ~~carried along~~ into their "great expedition" ^{local squirrels which} ~~long getting accustomed~~
^{had long lived} ~~in surrounding forest/scaffolding local protein~~. Each
^{squirrel} ~~protein-traveler~~ bore on itself the clouds of ^{infected} ~~seeded~~ by viruses
^{ticks} ~~mites/tongs~~ (on their one little beast they counted about 1800
^{ticks} ~~pieces~~).

In the searches of the scientific explanation of the wave nature of the encephalitis ~~of~~ two physicians - Yu. V. Aleksandrov and V. N. Yagodinskiy, ^{who} that served in the Far East, ^{west} left into the taiga to hunt for ^{ticks} mites/tongs - the carriers of ^{the} (waffle) virus. The armed by wafer towels "hunters" catchhed and accumulated for day hundreds of parasites, and then was checked in laboratories the degree of their infection by the viruses of encephalitis. The yield of "little ticks" in different years was by no means identical. In some years the virus ^{was} found ⁱⁿ almost ~~of the~~ half of the caught parasites. And then followed years, when ^{tick} mites/tongs for some unclear reasons were free ^{of} released ~~from~~ virus and ~~its~~ most persistent searches ^{for it came to} ~~nothing, did not lead.~~ The morbidity of people corresponded to changes in the degree of infection by the viruses of ^{ticks} mites/tongs and wood animals.

^A The many-year hunt ^{by} of ~~the~~ physicians for ^{ticks} mites/tongs did not pass without benefit for the science: Yu. V. Aleksandrov found in the taiga the unknown varieties of ^{ticks} mites/tongs. But, ^{no matter how hard} ~~how much the~~ ^{he} ~~physicians not were beaten,~~ ^{tried} the ^{intermittent nature} discontinuity of morbidity by encephalitis in the Far East did not obtain the comprehensive explanation.

^{Perhaps} It can be the unexpected ^{outbreaks} flash/bursts of epidemic ^{one} connected with the mass migration ^{of squirrels} ~~proteinst~~ ^{actually} After the mass migrations of squirrel ^{there did} ~~actually,~~ as a rule, followed ^{an increase in} necessary uplift of morbidity by

encephalitis.

When begun calculations, were traced curve/graphs. This assumption resembled ^{the} truth. But when the physicians compared the course of morbidity by encephalitis in the Far East with morbidity in other regions of the USSR, then "squirrel hypothesis" ~~it~~ lost its attractiveness. The curves of morbidity in the different, even distant regions coincided for some reason. It ~~emerged~~ ^{appeared} so that the disease ^{of} by encephalitis in the Far East was only a particular example of some more ~~common/general~~ ^{of ticks} total law. But which? The degree of the infection ~~of mites/ticks~~ ^{harbor ticks} by viruses was dissimilar in different years. ~~It is possible,~~ ^{Perhaps} it somehow depended on the number of ~~mites/ticks~~ ^{ticks} themselves.

The harvest of ~~mites/ticks~~ ^{ticks} in different years also oscillated and it was caused, probably by the number of animals, ^{which} on ~~which are~~ ^{harbor ticks} developed the ~~mites/ticks~~ ^{reproduction}. The multiplication of a squirrel ^s and other animals in turn, depends on the natural situation, dissimilar in different years.

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^A
The similar line of reasoning led the epidemiologists to the conclusion that the epidemic of encephalitis appears when in the

constantly existing natural location of disease ^{accumulates} ~~store~~ ^{adds up} the combination of the factors, which are favorable to epidemic, i.e., it is created the approaching "epizootic situation".

But then why, were puzzled the physicians, in ^{as} immense territory from foothills of the Urals to the Sikhote-Alin taiga, ^{a territory} very diverse in its natural conditions, ^{there} they do appear simultaneous uplifts and decreases in the morbidity? ^{It is obviously not a} ~~is obvious~~ matter ^{of} not in one virus alone and not only in the number of ^{ticks} mites, ^{squirrels} tongs or in live-stock protein, in weather or in a quantity of falling ~~out~~ precipitation. Here acts some more general, more main motive power. But ^{what} ~~is~~ which?

^{the} Solution was somewhere closely, but ^{was not} thrust ~~were~~ not given into ^{he} hands. ^{Fate helped to fall onto the right track} ~~Misfortune to accurate trace~~ aided the case. ^{One} Someone of the tender-hearted associates, attempting to aid the friends in the solution to problem, ^{A.L. Chizhevskiy was studying} recalled that ^{he} by research on wavelike nature of the epidemics of different infectious diseases ~~was occupied~~ A. L. Ghizhevskiy, and it advised to read his monograph "epidemic catastrophes and the periodic activity of the sun". This book came into being in 1930 (in a quantity of 300 copies) and it was ^{criticized} ~~into down~~ ^{to and arises and} and dust ~~criticized~~ severely; ^{and} since then of it did not republish.

The book ^{was} they found. The main thought, gotten from the book: the sun can be ^{play a part} ~~add~~ interfered in the course of epidemic.

This thought seemed the physicians by at first strange to absurdity. ^{But before finally discarding} ~~Before how it is final to discard it from the counts of~~ ^{consideration} ~~its reasonings~~, they decided all the same to verify it on their own small statistical material. For this they compared morbidity by encephalitis in the Far East for last/~~latter~~ several decades with the course of solar activity during the same period of time. ^{Images} ~~How was the~~ consternation of the epidemiologists, when the curve of morbidity and solar activity in many respects they coincided.

From the statistical theory of correlation it is known that, if the configurations of two curves are similar, then one of them reflect/represents reason, and another - consequence. Or they both reflect/represent the consequence of one reason. So answer/response to question, what is the reason for the epidemic of encephalitis, was found. ^{The} Sun !

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Thus the mysterious regulator, who reconstructed from time to time entire character of interrelations in wood biogeocenosis - these component parts of the biosphere, affecting, apparently, the epizootic situation, the number of providers of ^{ticks} ~~mites/ticks~~, and the

number of carriers of virus - ^{ticks}mites/tongs, and mainly the activity of the very exciter of encephalitis, but possibly, also the resistivity of people in the relation to disease.

^{a check conducted}
After ~~the~~ ^{attitude} made by epidemiologists ~~checking~~ ^{Now it could not merely be shrugged} their relation to solar hypothesis radically changed. ~~Now from it already~~ ^{off} ~~impossibly it~~ ^{The idea of} was simply to brush off. ~~thought about~~ the interference of the sun in the dynamics of ~~the~~ illness/sickness/disease, which periodically damages the population of ~~the~~ ^{regions of the globe} different in their natural conditions ~~regions of terrestrial globe~~, ^{won} subjugated them by ^{its} organic naturalness. From the skeptics ~~the~~ Lieutenant Colonel of the medical service V. A. Aleksandrov and the Major of the medical service V. N. Yagodinskiy "were converted" into ~~the~~ convinced ideological adherents of heliobiology and to this day continues ^{their} ~~its~~ investigations in this direction. In their overpersuasion ^{statisticians have} ~~played the last/latter~~ ^{a far from minor} role of statistician. As the reader further will see, the method of mathematical analysis generally is applied very widely for the development/detection of sun-earth biological communication/connections.

As a rule, the physicians very do not ^{grant much to} ~~give the~~ medical statistics. It seems them dry and dull in comparison with the clinical disciplines: indifferently it record/fixes both sad and glad facts - morbidity, mortality, age indices, the abundance of ^{certain} ~~those or~~

other illness/sickness/diseases, etc. ^{Yet, the fact is that} ~~On the very matter of~~
statistician ^{are very} - the bread of medicine. The development of any science,
including biology and medicines, is inseparably connected with
accumulation and processing statistical data. Any scientist, ^{seeking} finding
laws in chaos of phenomena, repeating many times one and the same
experiment, is ^{dealing with nothing less than an} ~~occupied not than by different as~~ accumulation of
statistical evidence. "Statistical work" produces involuntarily any
practical physician, ~~record~~/fixing in the memory the similar cases of
diseases.

Right was the ^{great} ~~large~~ Austrian physicist Ervin Schroedinger, ^{who} ~~which~~
~~he~~ wrote: "the laws of physics and chemistry are thoroughly
statistical". And in living nature many processes in the final
analysis ^{are} ~~is~~ subordinated to statistical laws. Processing uniform
data, obtained not in laboratory, but as a result of observations of
the phenomena of the surrounding world, actually ^{represents the} ~~had been~~ processing
the results of the grandiose experiment, ^{performed, as it were, by} ~~realized~~ seemingly nature
^{herself} ~~itself~~.

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In order correctly to select, to interpret and to process many facts,
necessary to manage not only mathematical apparatus, but also
scientific logic. Under these conditions of statistician it becomes

^a
the powerful instrument of knowledge.

Its conclusions scientific statistics expresses in the form of curves, setting forth the essence of phenomenon in mathematical or graphic language. This made it possible seemingly immediately to see with own eyes phenomena in their complex interconnection. It ^{of} is ~~is~~ ^{course,} ~~natural that than~~ ^{the} more data it is investigated in the study of one problem, ~~by those to~~ ^{the} more easily ^{is)} solve ^{el} the problem of the dependence between phenomena. The more the facts ^{ed in} it covers the investigation, ^{the} facts more accurate ^{and} ^{the} more precise result.

In ^{for} the searches of the explanations of the wave nature of the encephalitis of two physicians - V. A. Yagodinskiy and Yu. V. Aleksandrov - independently ^{came to the} approached the conclusions, ^{at} ~~at whom~~ ^{before} arrived ^{by} for half a century ~~to~~ them, one of the authors of this book - A. L. Chizhevskiy.

~~Give~~ ^{trace} Let us return to the past let us ~~observe~~ the first ~~step/pitches~~ of the science of sun-earth biological ~~communication/connections~~ - heliobiology.

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Black death.

...^{Cases of} "Attention! Diseases ~~by~~ smallpox are recorded in provinces of Madagascar.... In the Italian port of Brindisi - death from smallpox.... In Turkey several cases of typhus" - similar radiotelegraph bulletins ^{are broadcast in} ~~fly away~~ once during ten days out of Moscow ^{to} ~~in~~ all ends of the Soviet Union.

The epidemiologists and the physicians, who guard the sanitary boundary of our country, await report about epidemic danger ^{just like} ~~so, as~~ pilots await report about weather. Signals ^{put them on guard} ~~prick up ears~~: the invisible "microsaboteurs" - the excitors of dangerous infections - can cross the state boundary. Cannot be let pass them !

On the Soviet side of the foreign guests, who arrive from the countries, where, ^{there are still outbreaks} ~~until now, still are the flash/bursts~~ of especially dangerous infections, usually ^{meet} ~~encounters~~ the whole board: the customs officers, the frontier-guards and without fail

physician-epidemiologist.

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In the USSR there is a law, according to which no one has a right to obtain ^{permission} ~~resolution~~ for entrance into the country or the departure abroad, if ~~to it are not made~~ ^{he has not received} all the necessary inoculations against "especially dangerous infections" - plague, cholera, typhus, smallpox, yellow fever - and ^{has not received} ~~is not given out certificate~~ is a special certificate. If guest does not have a certificate, then an inoculation to him they will make here on boundary.

With difficulty ^{does the} efficient, hasty traveller forces ^{himself} itself to ^{for perform} ~~fulfill~~ completely "excess formalities" in order that nothing it would ^{prevent him from going} ~~stir it to go~~ further. But meanwhile contemporary quarantine measures are very simple in comparison with the past.

...The year 1552. In Pskov appeared terrible guest - plague. The hum and the chime of church bells spread alarming news all over town. Information rapidly reached to Novgorod. Immediately, as testifies Novgorod chronicler, "Rapidly ^{inform} ~~call~~ in Novgorod about Pskov residents ^{so that} ~~in order~~ that they would go there ^{leave Novgorod immediately} ~~the hour of that of Novgorod~~ with ^{any} ~~goods~~ ^{they might have} ~~by which not wake~~ ^{And if} ~~But they will catch the guests of Pskov as~~ ^{are caught tomorrow} ~~tomorrow~~ ^{they will be taken from} ~~in Novgorod, his vyvedshi for the city of szhechi and with~~ ^{and burned alive}

E

erect a goods! And ~~to be to~~ gate on Pskov road in ~~order that they would drive~~ ^{to prevent traffic to} into Pskov, ^{and} not from Pskov into Novgorod". [Trans. note: the preceding passage is written in old-style Russian, and is therefore mostly untranslatable.]

Everywhere authorities arranged ^{erected strong gate} "gates ~~strong firm~~", where each visitor ^{at a distance from the gate} "they questioned ~~due to winch from a distance~~" ^{and} before letting ^{him} pass into city washed, fumigated his clothing. If it arrived from the infected places, then they planted ^{him in} it to long quarantine. Even important state ^(decrees) ~~certificates~~ ^{at} on gates first "they copied through the fire/light" and only then sent ^Q ~~away~~ copy ^{to destination} according to ^{while the} ~~designation/purpose~~, but original they burned.

Antiplague and anti-choleric quarantines existed in Russia from XVI century. Still earlier then they instituted in Italy, where ~~swam~~ ^{trading ships arrived from} ^{By} ~~up commercial law court from the~~ different countries. Creating quarantine, people they hoped to avoid the arrival of the terrible illness/sickness/diseases: plague, smallpox, cholas, which ^{moved} into short periods seized enormous territories, ~~transfer/converted~~ from the country to the country, from one continent to another. ^{Yet} ~~But~~ overcoming any obstructions, dangerous infections all the same periodically were spread on entire world and also suddenly disappeared. This fact, known from a deep antiquity, apparently, lay as the basis of Greek myth about Pandora, discharging

illness/sickness/diseases from the box, where they ^{were} ^{up to a} stored ~~up to a~~ certain time ~~to is time/temporary~~ ^{it}.

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But whence nevertheless ^{came} ~~were made smooth~~ to humanity "pestilent infections" - epidemics and pandemics? What ~~did~~ contributed ¹ to their appearance? How to explain the catastrophical rapidity, with which the pandemics from time to time did ^{overtake} ~~understand~~ planet?

The spontaneously catastrophical character of the propagation of epidemics long time did not yield to explanation. To guess the reasons for the periodicity of their appearance attempted half a century ^{the} ~~back~~/ago (then also ^{very} ~~entirely~~ young researcher A. L. Chizhevskiy. First he attempted to find answer/response to his agitated questions in vast historico-medical literature. From the books the scientist learned, that people have long already noticed strange ~~communication~~/connection between many terrestrial natural calamities, including infectious illness/sickness/diseases, and ~~Edgetar~~ "celestial" phenomena.

^{In its days} ~~on its to century~~ our planet ^{has experienced} ~~tested~~ numerous shocks. ^{It has} ~~By it fell~~ ^{had} out and happy, relatively calm, the epochs, when nothing disrupted the peaceful current of life, and epoch ~~agitated~~, when the whole

world came at once into the agitation: spontaneous/~~elemental~~ catastrophes, floods, droughts, earthquakes, volcanic eruptions, the ^{inundations by} mass coatings of insects, epidemic, epizootic disease and epiphytia, the hunger, which raged in many countries, even whole continents. The Centuries-old ^{experience} experiment of this type even gave rise to in-Greeks idea about "mutual sympathy" - ^{the idea that} ~~thought about~~ the interconnection of all things, processes and phenomena in the universe. Communication/^{Certain} connection, since olden times realized by people, at the ~~determined~~ ^{certain} torque/moments of history became maximally convincing, literally perceptible.

The Roman poet Ovid, narrating about the general illness/sickness/disease, which struck in I century B.C. of the inhabitants of the island of Aegina, notes that it "it overcame people, animal and plant simultaneously". Even earlier than Ovid Sophocles wrote in play "Tsar Edip" about the fact that "the illness/sickness/disease ^{is} transfer/^{and} ~~converts~~ ^{to} from field sowings onto the animal^s and ^{unborn} ~~uterine~~ babies".

Because of Greek historian Thucydides to us it is known that the epidemics, which broke out in Attica between 436 and 427 for years B.C., were accompanied by earthquakes, maritime floods, droughts, bad harvests, ^{and as} the intensification of activity ^{in the} of Vulcan ^{as} The mighty forces of the raging nature, ^{united, as it were,} ~~as it were combined~~ against man during

"Attica" illness/sickness/disease. In Athens the earth tremors destroyed many buildings.

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As an example of "common/general/~~total~~ excitation in nature", peculiar fever, if ^{might be so} then it ~~is possible to be~~ expressed, ^{is} can ~~serve~~ the period from 251 to 226 years B.C. (epoch of Cyprian's pestilent ^{plague} ~~plague~~). Vibrations of the ^{earth's} ~~soil~~ were noted then in Europe (in Italy), Africa, Asia.

^{No} Are less valuable for the science ^{are} of the indication of the ancient manuscripts ^{on} the relationship/~~ratios~~ between weather and propagation of epizootic diseases and epiphytia. ^{Thus} So, the period of 1770-1775 was marked by the development of the natural calamities, ^{by} ~~after which they followed~~ epizootic disease, in particular the rinderpest, which went around all of Europe. The historians and the writers, the eyewitnesses of natural catastrophes, who lived in the different countries and in different time, unanimously noted that the powerful "fermentation" in inanimate nature almost without fail is combined with the revelry of pestilent infections among people. Most ^{it was from this that} likely ~~precisely hence~~ ancient medicine got persuasion, that also the unhealthy processes, taking place in living organism, are ~~located~~ under the direct effect ^{of} celestial, or, as we speak now, space forces,

because of their powerful mysterious influence. The observed agreements in time of celestial and terrestrial phenomena, for example, the emergence of sunspots or aurora in the years of natural catastrophes, were so/such frequent, that in many peoples arose even the faith in "signs".

However, ^{the observed} noticed communication/connection of phenomena was not ^{as} the empty game of fantasy. It is interesting that the "systems of omens" ⁱⁿ ~~at~~ all peoples and in all times were amazingly similar. For an ancient Chinese, a Russian chronicler, a Gaul and a Mongolian the strange coloration the firmament, ^(arrow-shaped) herringbone clouds, ray/beams, the columns and eddies of aurora, the earth tremor, spot on the sun or circles about it ^{then} constant/invariably preceded misfortune's onset. So, in the patriarch chronicles of 6874 years written following

report/communication:

"There was a sign in the heavens. In the same year there was a great plague in Moscow. In the same year there was a very great plague in Vologda. In the same year there was a great plague in Lithuania. In the same year there was drought and great ^{great} and great famine over the whole earth."

Science did not pass over these most interesting empirical observations. The scientists and the physicians of antiquity (Hippocrates, Celz) ^{much} reflected ^{above} the nature of celestial influences.

Later the epidemiologists and the hygienists made ~~the~~ repeated attempts to explain how affects environment ^{the} propagation and ^{the} course of the illness/sickness/disease: they ~~were~~ investigated the influence of the pressure of atmosphere, air humidity, weather, temperature, etc. ^Q Beginning with the outstanding Italian hygienist Ramazzini, ^a whole pleiad of ~~the~~ ^{these} scientists devoted ~~its~~ works to the explanation of the interconnection between morbidity and meteorological phenomena. For example, in XIX century Faraday hotly defended the possibility of influence on the organism of the atmospheric electricity, ^{causing} calling the formation/~~education~~ of ozone. During the cholera epidemic ^{the} of 1837-1838 the reason for the cholera many physicians ^{they} considered "electricity and magnetism" of the Earth.

"Every time, wrote later noted Russian physician F. Inozemtsev, with the advent of atmospheric ^{storms} thunderstorm we saw that the number of ^{cholera patients entering the} supply/~~delivered~~ to hospitals ~~cholera patients~~ suddenly considerably grow/rose, ^{and} ^{that died} the number ^{greater than} ~~died~~ was ^{that which} more, rather than ~~as this it~~ occurred before the appearance of (thunder)storm" ¹.

Another Russian researcher, N. A. Skalovskiy ², in 1908 appeared ^{presented} with reports about ^{on} the role of meteorological phenomena, in particular atmospheric electricity, ^{on} to the course of cholera epidemic. Finally, ^{on} in English researcher, Moore, in ^a the publication ⁱⁿ 1886, perhaps, ^{gone} appeared for the first time reference to the sunspots,

"which, in the opinion of some researchers, can have a known effect on the state of the environment, contributing to the development of epidemics" 3.

FOOTNOTE 1 P. Inozentsev. Using milk as a cure. Moscow, 1857.

2 N. A. Skalovskiy. The microccsmos and the macrocosmos. St-Petersburg, 1913.

3 B. J. Moore. A manual of diseases of India. London 1886.

END FOOTNOTES

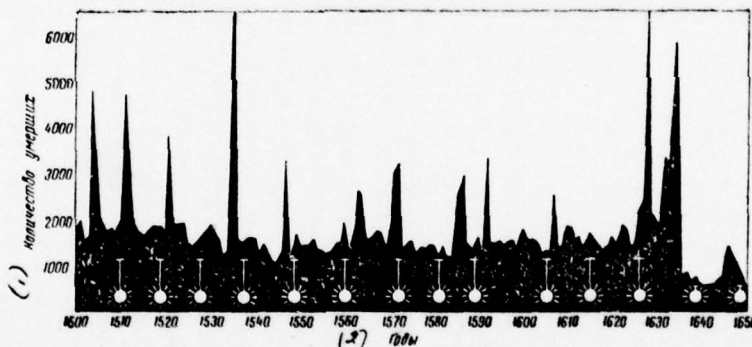
After ^a the ^{er} deepened acquaintance with the most extensive historico-medical literature A. L. Chizhevskiy decided to verify with the aid of astronomical and statistical comparisons most probable in his opinion solar version ^{his} ("Working hypothesis" ^{was} served the idea, ^{that} ~~according to which~~ in the ^{nature} being repeated ~~character~~ of epidemic catastrophes, apparently, is partially guilty the monitor of ~~the~~ life of planet - the sun !

This ^{was} preceded ^{by} this line of the reasoning: meteorological factors (temperature, pressure, humidity) undergo vibrations constant and even

in two closely lying ~~horizontal~~ points ^S items give different readings.
It is possible to immediately discount them.

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Mortality in Augsburg from pestilential epidemics from 1501 through 1650 and solar activity during the same period. The maximum of diseases is designated ^{by} in asterisk. (Curve/graph is comprised by A. L. Chizhevskiy according to data of Resle) ^{key:} 1. Quantity of the dead persons. 2. years.



But there is a group of the phenomena, which simultaneously cover the enormous spaces: for example, the perturbation of terrestrial magnetic field or atmospheric electricity. But electrical, magnetic, electromagnetic phenomena in the earth's crust and the atmosphere in turn, depend on the phenomena space, mainly on the influence of the sun. But that means first of all ~~it is to~~ ^{we must} investigate the question concerning ^{relationship} ~~relation in which are found~~ ^{of certain} those or other epidemic diseases with solar activity.

In order to verify "solar hypothesis", one ought ^{should} ~~not to have~~ studied ^y the most extensive statistics ~~long~~ ^{long} of passed epidemics. And then, after comparing chronological tables with data ^m ~~of~~ the activity of the sun in the corresponding periods, to obtain at least partial answer/~~response~~ to the ^{posed} ~~placed~~ questions.

After ~~the~~ ^{performed} "excavations", ~~produced~~ in a series of historical archives, was comprised ^a ~~the~~ detailed chronological table, which systematized the information about the largest epidemics and the pandemics of plague from 430 years on 1899.

^{Evidence remains to this day on}
~~To the present and the remainder evidence about~~ the pestilential epidemics of the Ancient Greek historians of Herodotus

and Thucydides, ^{the} greatest physician of the antiquity, of Hippocrates, etc. Especially powerful epidemics of plague remained in history with the names of rulers and celebrities of that time.

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In ^{the year} 125 year raged "plague of Oroziya", in 165-168 years - "plague of Antonina and Galenus", in 251-266 years - "Cyprian's plague", in VI century - "Justinian's plague". The historian Yevagriy, the eyewitness of Justinian's plague, ~~it~~ noted that its intensification and weakening were ~~accomplished~~ ^{with} periodically, whereupon for each period ~~came on the average about~~ ^{averaging} 15 ~~summer~~ years and in each such ~~development~~ ^{the development} period of plague it was more powerful on the second year. ^{From the} ~~With VII or XIV century plague~~ ^{rolled across} ~~was given a ride on~~ Byzantium, Italy, ^{appeared} ~~it was~~ in France and Germany. In IX century it produced devastation in Europe. In XI century the illness/sickness/disease appeared for the first time in Russia. In XII-XIII centuries it raged in Egypt, Syria, Greece, Italy and literally moved ^{down} the troops of the crusaders. The bony hands of "black death" in XIV century embraced the whole world. From Central Asia the commercial caravans carried the plague ^{to} ~~in~~ the coast of the Caspian, Black and Mediterranean, from there it penetrated ^{did in a} ~~to~~ the European continent, where ~~ruined the~~ fourth of entire population.

The contemporaries of "black death" - the ^{great} grandiose pestilential epidemic of the XIV century, ^{the most} by the very powerful ^{of} from all, which tested humanity, ^{has experienced} left several detailed stories about this calamity, which devastated Europe ^{and} Asia for some three years (1348-1351 years). And in these descriptions furthermore the appearance of an epidemic is compared with the ^{outbreak} revelry of the spontaneous/elemental forces of nature. ^{In the Far} "On the distant East, wrote de Mussi, in China black death ^{was} preceded ^{by} the signs: ^{it rained} ~~went rain from~~ snakes and the toads, which began to crawl ^{of into} in dwelling, and they killed people. From sky flowed the ^{torrents} ~~flows~~ of the blood and fell stones".

Of course, to us it is difficult to ^{refrain} ~~now retain~~ hold down from smile, reading these juicy, but naive chronicles. Nevertheless one should say that ^{even} the Chinese chroniclers noted at this time exhausting heat, droughts, and then floods and the general illness/sickness/diseases, which destroyed ^{up} to five million people, ^{famine} ~~hunger~~ strike, the devastating ^{hordes} ~~raids~~ of locust. According to the noted German historian of general diseases Geser ¹, similar events preceded "black death", also, in other parts of the world/~~light~~.

FOOTNOTE ¹ H. Geser. The history of general diseases. St-Petersburg, 1866. END FOOTNOTE

During the year of its maximum propagation (1348) from south to north and from the east to west ⁱⁿ Europe ^{here rolled} were given a ride the waves of earthquakes, which destroyed ~~the~~ cities, causing ^{forest} ~~foot~~ fires and flooding of rivers.

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In ^{the} ~~XV-XVIII~~ centuries of the epidemic of plague they appeared in ^{various} ~~the different~~ parts of terrestrial globe. In XIX century plague nested in Egypt, Persia, Armenia, periodically appearing in Europe. From India "black death" ^{moved to} ~~it was fixed into~~ Africa. Why so inscrutable and whimsical were its way? Epidemiology this question did not answer. Neither precipitation nor atmospheric pressure nor climate explained the dynamics of pestilential epidemics. At the end the XIX centuries in report about pestilential epidemic in Vetlyanka Stakhovskiy wrote: "Apparently, in the environment something occurred, which suddenly ended epidemic in Astrakhan province even prior to the arrival of antiplague board".

After all the possible information from contemporary sources about plague was assembled and ^{fed} ~~given~~ into system, A. L. Chizhevskiy ^{found} compared two phenomena: solar activity and plague. What was obtained?

The points of the maximums curve, ^{depicting} depicted course of solar activity, were arranged ^{d just} located above uplifts curve, ^{rises in} reflected the dynamics of propagation ^{of} plague. We give here the diagram of mortality from plague in city Augsburg from 1501 through 1650. After glancing at figure, the reader ^{himself} it can ~~itself~~ be convinced of the agreement of two curves. ^{thus} So, the first attempt to compare the vast, thoroughly assembled statistical data on morbidity with the "work" of the sun made it possible with sufficient authenticity to draw the conclusion that some interconnection of solar activity with propagation and activity of the epidemic of plague unconditionally existed !

^{Yet} ~~But~~ perhaps ^{the} whole matter ^{lies within the} in the special feature/peculiarities of precisely this illness/sickness/disease? But other diseases the sun does not affect? This assumption also needed checking. For this it was necessary to examine the dynamics of other diseases, in order to as has already been ^{said} ~~spoken~~, "to fill the larger possible number of facts" and to obtain either negative answer/response or the new proofs of its rightness.

Through strong gates.

^{As} The epoch of the unprecedented ^{blossoming} "bloom" survived not only plague, but also such heavy diseases as leprosy, cholera, syphilis, smallpox....

Historical and paleopathological data show that ^{individual} the separate diseases can in their own way ^{decline} grow sickly and ^{blossom} bloom, they first conquer, devastate and frighten ^{the} world, then ^{barely} hardly they glimmer in ^{their} its favorite foci. ~~There is no time~~ ^{the once} terrible cholera, for example, since olden times got accustomed in India. ^{Perhaps this is why} It can be therefore the first descriptions of the powerful ^{outbreaks} flash/burst of the cholera epidemic, which pertain to the year 1031, are made by Hindu writers. Then the information about the epidemics of the cholera, which occurred during the years 1364-1367, we find ^{with} at the Persian writers. ^{During full bloom} At the ~~crisis/climax~~ of the cholera epidemic of those ~~summer~~ years the Chinese chroniclers noted the very large spots on the sun, seen with the naked eye.

The epidemic of cholera appeared in Constantinopol, Arabia and

Egypt shortly before the conquest of Byzantium by the Turks, into 1453. On the basis of some data it is possible to assume that in period ^{of} ~~in~~ 1445 ^{through} ~~in~~ 1447 the activity of the sun rose to maximum. Then during long time about the epidemics of cholera there are no precise information.

The French traveller Sonnerat, who visited in XVIII century India, left the description of the devastating epidemic of the cholera, which ^{killed} ~~took away~~ from 1768 through 1771 several tens thousand ^{victims} ~~sacrifices~~. In 1769, in the period of the propagation of cholera in India, Staudacher in Nuremberg and other observers they noted an increase in the solar activity.

Weighty data on the considerable epidemics of cholera on the Koromandel coast during the years 1774-1780 coincide with data on ^a maximum increase in the solar activity in 1778. Is known the epidemic of cholera in Trankvebar, Madras and other places of India during the years 1778-1790. The maximum ^{of} ~~of~~ spot formation is noted by the astronomers in 1788....

^{The} Beginning of the XIX century was marked by the epidemic of cholera in India ~~into~~ 1804. The maximum of solar activity falls during the years 1804-1805.

In the elapsing century the cholera in stages devastated humanity, accomplishing repeatedly round-the-world journey.

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Let us observe the sequence of cholera attacks and the behavior of the sun in the years of such pandemics. The first pandemic lasted from 1816 through 1823. In 1816, when spot-formation process reached ceiling ~~voltage~~, cholera flared up in India, after encompassing very large territory and after ^{Killing} ~~ruining~~ hundreds thousand people. In 1817 it exceeded the limits of India, it penetrated ~~in~~ Indochina, to islands Ceylon, Borneo, Celebes and Philippines, costing hundred thousand human lives. Then it was extended to Persia, after devastating Shiraz and Tavriz. In the winter of 1882 cholera reached ~~to~~ the shore of Caspian Sea, and during June 1823 it was ~~reveal~~/detected in Astrakhan. Since 1822 the epidemic began ^{used} ~~to step~~ back. Everywhere they noted its weakening. 1823 ^{He} ~~is an~~ end of the first pandemic. Specifically, in this year occurred the ⁹ minimum of solar activity. Thus, ~~and~~ the beginning and the end of the first pandemic coincide precisely with ^{the} ~~for~~ years ^{of} maximum and minimum of solar activity.

The second pandemic of cholera lasted whole 10 ~~summer~~/years (1827-1837). In Bengal and in Indian archipelago in 1827 was recorded

the next ~~flash/burst~~ ^{outbreak} of cholera. In a year the cholera was extended to west and in 1829 (in the period of the maximum of solar activity) appeared in the Orenburg, where continued for three ~~summer~~ years, ~~unconquered~~ ^{unconquered} even by winter colds. In the beginning of 1830 the epidemic seeped in many cities of south Russia and from there began to be spread to north. (It by the way, stirred A. S. Pushkin to return from Boldino into Moscow to ^{his} bride. Entrance into Moscow was forbidden). In the same 1830 the cholera penetrated in Western Europe and gave a series of extremely deadly ~~flash/bursts~~ ^{outbreaks} in Italy - in Rome, Palermo - and in other states, including in England.

From the winter of 1832 the epidemic in Russia ~~is banal for the~~ ^{began to} ~~loss/depreciation:~~ ^{decline} illness/sickness/disease ceased in winter months and gave only the small percentage of mortality. The same one should say, also, about Western Europe. Into 1834 in Russia ~~not at all~~ ^{no cholera} it was recorded ~~the diseases by cholera~~ ^{at all}. Only in autumn, when in abundance appeared fruits, ~~the~~ ^{where} relapses of cholera were noted in southeasterly provinces. In 1835 Russia was freed ~~from~~ ^{of} it completely. And, by the way, into 1833 occurred the minimum of solar activity.

The subsequent rapid approach/approximation of the maximum of solar activity and the very torque/moment of maximum (1837) coincided with the intensification of cholera epidemic both in Russia and outside boundary.

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The third pandemia of cholera arrived during the years 1844-1860. Similar to the preceding/~~previous~~ pandemics, cholera ~~and~~ ^{Covered} this time took the time interval, ^{occupied by the} engaged ~~two~~ ^{and} maximums of solar activity during the years 1848 and 1860 ^{and} even one minimum in 1856. ^{As early as} ~~Once into~~ 1844, the activity of the sun ^{had} sharply increased, which was accompanied by the noticeable intensification of cholera in India. The epoch of the ripening of the maximum of 1846 was marked by the ^{an} extremely rapid development of the cholera: illness/sickness/disease was extended ^{to} ~~on~~ entire Arabian peninsula and appeared in the Caucasus. In 1847 the epidemic encompassed whole shore of Black Sea and partially Asia Minor, it penetrated in Constantinopol, which since 1848 was the main center of the propagation of cholera.

Into Russia the epidemic seeped in 1847 and immediately spread in the country, ^{just like a} ~~accurately~~ grease spot on ^a paper. To the spring 1848 it penetrated in all provinces. ^{By} To September ^{all} ~~to month~~ ^{of} ~~entire~~ ^{illness} ~~all~~ Russia was enveloped by diseases. At this time the epidemic raged in Austria and Germany. It began to weaken in 1849. During the years 1850-1851 in Russia the cholera almost completely disappeared. Thus ended the first destructive raid of cholera wave.

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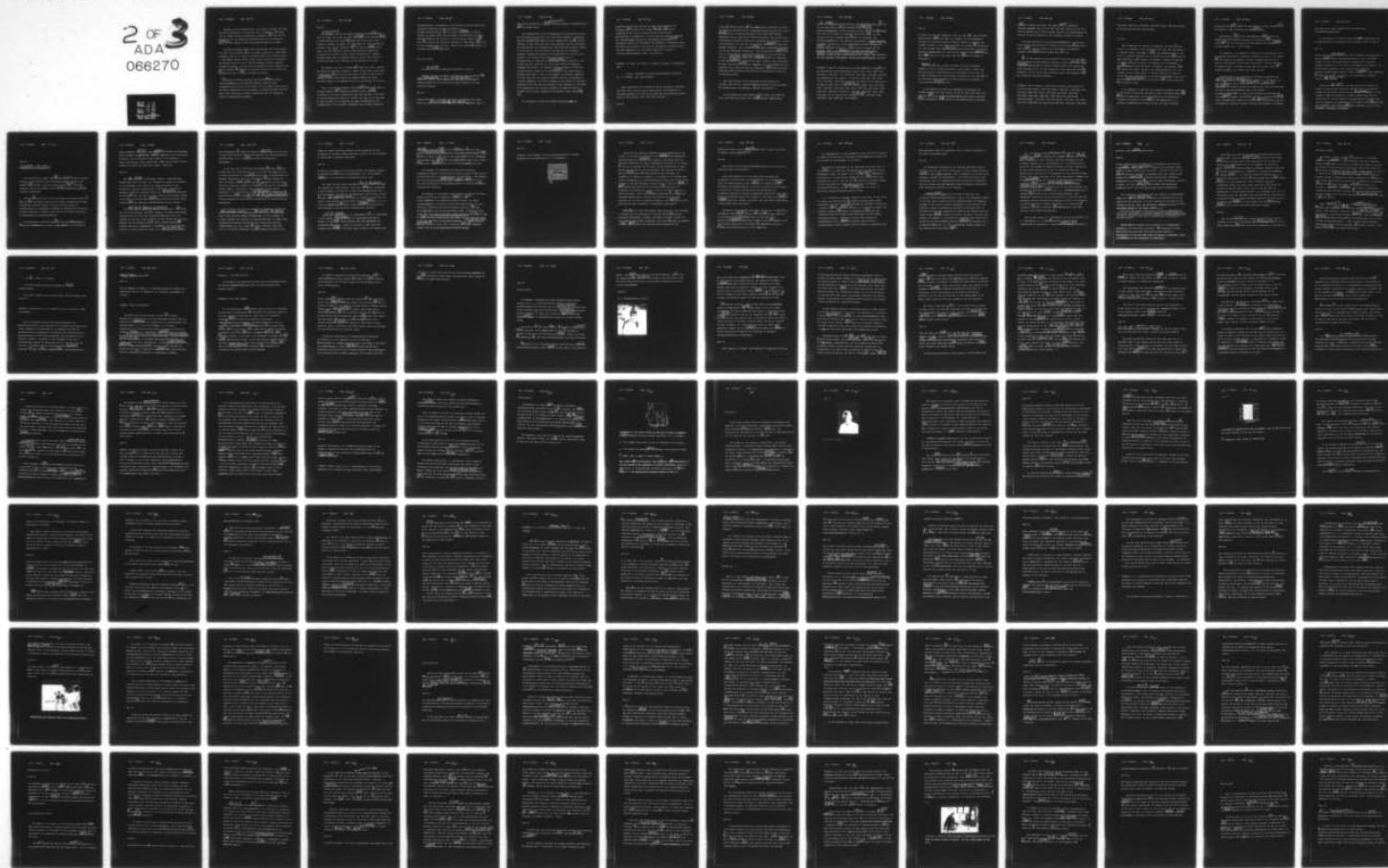
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However, in the following year, as if water in flood, its flows from India spilled far to northwest, after encompassing ⁹ the large part of Europe and after penetrating in America. ^{from} With 1852-1853 the activity of the sun begins to noticeably fall and its minimum ^{Coincides with} it falls ~~on~~ 1856. Cholera in 1855 also begins gradually to weaken.

The fourth pandemia lasted from 1863 through 1875. From Bengal into 1864 it was extended ^{to} ~~on~~ entire Indian peninsula, it penetrated in Hedjaz, and then in Mecca and Medina. Hence the pilgrims carried it into Egypt, Turkey, Italy, France, Spain, and also into England and Germany. From the end of 1869 the pandemia suddenly acquired devastating nature. (In 1870 came the maximum of solar activity). The wave of cholera, ^{per} ~~on~~ official information, lasted of up to 1872, but ^{for} ~~an~~ additional year-two ^{here} ~~were~~ the cases of cholera.

^{The} Division of cholera epidemics into ^{Certain} the determined periods, naturally, ^{is} somewhat conditionally. Cholera generally never disappeared with the face of the Earth. It only abated, from time to time after concentrating in any region of terrestrial globe, and then again under the effect of ambient conditions with the unexpected force it covered enormous spaces.

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A decade passed
~~Pass decades.~~ Cholera no longer disturbed Europe, *and it* ceased it, also, in India. But during May 1883 (*in the year* ~~per annum~~ of the maximum *strength* voltage of solar activity) *el* were reveal~~ed~~ detected the first cases of the disease by cholera in Bombay. Thus were begun the fifth pandemia of cholera in XIX century. Hence, the *path* ~~way~~ of cholera lie~~d~~ *lay* into Egypt, and then *to* in France, whence, after breaking through all quarantines, it moved in Italy, Spain, Switzerland and Germany. Beginning from 1886 the epidemic began to weaken. This weakening coincides in time with a decrease in the activity of the sun.

The latter, the sixth, pandemia *was* ~~were~~ begun into 1892. Crossing the border of Hindustan, cholera it moved to north and to northwest, it penetrated in *to* Turkistan and from there in Russia, where it was *contained until* held up to 1896, after causing the outbreak during the years 1892-1895 (years of the maximum voltage of the activity of the sun).

Thus, the cholera pandemics, which *rolled* ~~given a ride on~~ the Earth in the past century, *which* ~~the~~ encompassed enormous spaces, *show* ~~detected~~ conformity in all their fluctuations with fluctuations in the force of the spot-formation process on the sun. The years of the minimums of solar activity in the majority of cases corresponded to the disappearance of this disease. Frequently even separate incidental

intensifications or decreases in the activity of the sun ~~it is~~ very accurately coincided with the development of ^{then} illness/sickness/disease. So, the famous ^{outbreak} ~~flash/burst~~ of cholera epidemic in Hamburg ~~into~~ 1892 accurately coincided with the sharp intensification of the activity of the sun during August of ^{that} this year. ^{By} ~~To~~ 20 August the morbidity increased to 1000 people ^{per} during day. In all in Hamburg were 17 thous. cases of the disease ^{of} ~~by~~ cholera, of them 8605 were ^{ended in} ~~finished by~~ death.

Wave after wave.

^{has not had}
Who did not ache ~~by~~ influenza? Find such a person!

Neither sanitary propaganda nor serum nor gauze bandages, ^{not} even ^{even refraining from the} ~~failure of pleasure to be greeted in a friendly way for hand -~~ of a ^{friendly handshake} - nothing shields us from the visits of this "innocent", but the ubiquitous disease.

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Honesty and modesty force the physicians to recognize that they, ^{have no control of} ~~until now, above the influenza thus far are not imperious. From it~~ ^{over influenza.}

innoculations save us
~~save~~ neither medicine nor ~~grafts~~ Influenza appears and disappears in ^{just} ~~order~~ to appear again.

The epidemiologists, the virusologists, the physicians explain this regularity by the facts that after each pandemic of influenza humanity seemingly ^{to} ~~obtained~~ on several summer/years forward natural immunity to this virus. But then virus acquires some new properties, new possibilities for contamination. Post-influenza immunity weakens in the course of time, and appears the new wave of influenza, sometimes extremely disastrous. This explanation is close to truth. However, it is possible that the regular returns and the disappearances of influenza can ^{be the result of} ~~produce~~ some other reasons. It was noticed that the epidemics of cholera and influenza frequently accompany one another. For example, the flu epidemic of 1815-1816 preceded cholera pandemic. The flash ^{outbreak} ~~bursts~~ of the second cholera pandemic were close in time of the epidemic of influenza 1828-1832 and 1836-1838. The third cholera pandemic also was accompanied by influenza epidemics. The fourth pandemic of the cholera of 1863-1875 coincided at the end with the epidemic of the influenza of 1873-1875. The termination of the influenza epidemic of 1889-1891 served as "signal" for the sixth pandemic of the cholera, which begun ^{since} ~~since~~ 1892.

It is necessary to say that neither bacteriologists nor

epidemiology long time had criteria for precise diagnosis of influenza, ^{while} ~~but~~ virology, as is known, ^{has} ~~exists~~ ^{ed} ~~a total~~ ^{only} of 70 summer/years. But since the descriptions of the clinical sign/criteria of epidemics of XV and of the XVI centuries coincide with the ~~now taken~~ ^{now used} criteria for determining influenza, A. L. Chizhevskiy decided to investigate the epidemics of influenza during this historical period on the basis of information, obtained mainly from the compositions of the German historians of general illness/sickness/diseases Geser ¹ and Hirsch ².

FOOTNOTE ¹ H. Geser. The history of general diseases. St-Petersburg, 1866.

² Hirsch. Handbook of historical-geographical pathology. Vol. 1. Erlangen, 1860. END FOOTNOTES

Geser encountered the indications of the epidemic of influenza into 1403, 1411, 1414 and 1427. Hirsch begins the chronology of influenza epidemics with XVI century and notes the following epidemic years for the century: 1510, 1557, 1591 and 1593.

During the period of time ^a into 340 ~~summer~~/years, according to Hirsch, the influenza epidemics of ten times ^a covered entire Europe, nine times ^{covered} the large part of Western hemisphere, four times whole Western hemisphere and six times whole eastern hemisphere. Hirsch with large thoroughness gathered the materials, concerning not only more or less large epidemics, but even the insignificant ~~flash~~ ^{outbreak} bursts, which bore epidemic character. Since a ^{such} similar kind of the epidemic of influenza are not the phenomenon exceptional - they almost yearly ~~flash~~ ^{break out} in one, then in other country they bear the character of the mass seasonal catarrhs, ^{they have not been considered in} ~~then~~ did not accept into consideration ^{outbreaks} for the comparison of the ~~flash~~ ^{cases of} bursts of influenza and solar activity. Were considered the only those general influenza ~~diseases~~, which undoubtedly bore the character of the mass and powerful infection, ^{that} they covered the whole countries, ~~the~~ continents, hemispheres and sometimes the large part of terrestrial globe.

The first attempt at the comparison of the epidemics of influenza with data on the spot-formation process on the sun showed that between these two phenomena is ^{a)} known relationship ¹.

It was noticed that the epidemics first follow one after the other every one-three years, then ^{after} through several ~~summer~~/years.

In comparing
 During the ~~comparison~~ of the groups of the epidemics, which ^{have} give one, two or three waves and ^{are} ~~isolate/insulated~~ ^{with respect to the} at time of the departure/~~withdrawal~~ of spot-formation process, ^{it was} ~~were~~ ^{ed} reveal/~~detected~~ that, while the groups of epidemics fall on one ^{rise} uplift in solar activity and they lie/~~rest~~ ^{they} within ~~limits~~ the "minimum", the isolated/~~insulated~~ in time epidemics lag behind the ~~nearest to them~~ ^{nearest to them in time} on ~~time~~ of groupings or isolated/~~insulated~~ epidemics through ~~one~~ ^{by one} or ^{by} minimum either the maximum or through several minimums and the maximums. Then it was ^{decided} ~~solved~~ the following one after another epidemics of influenza to consider as waves of the same epidemic, caused by some common/general/total reason. This assumption did not contradict information, gotten from epidemiological sources.

FOOTNOTE 1 With the intensification of spot-formation process ^{u/} on the sun coincide the following epidemic years: 1427, 1557, 1602, 1647, 1657-1658, 1756-1758, 1767, 1802-1803, 1826-1828, 1857-1858, and with the weakening of this process - 1591-1593, 1642-1643, 1688, 1709, 1712, 1732-1733, 1742-1743, 1850-1851, 1873-1875. To the epoch of the maximum of solar activity ^{coincide with} ~~come~~ the epidemic years: 1403, 1411-1414, 1580, 1626-1627, 1675-1676, 1693, 1728, 1737-1738, 1761-1762, 1779, 1788-1790, 1805-1807, 1815-1817, 1829-1830, 1836-1837, 1846, 1848, 1860, while to the epoch of the minimum ^{coincide with} ~~coincide with~~ 1655, 1775-1776, 1798, 1843-1844, 1855, 1889-1891. END FOOTNOTE

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It turned out that the epidemics, close in time, ⁱⁿ from their clinical ^{show} sign/criteria detect much that is in common. As the beginning of epidemics (in cases two-three of adjacent waves of influenza) was accepted the date of the first wave after the minimum. ^{of} Such groupings from 1403 through 1928 ^{there were} reader/showed twelve. All periods of influenza epidemics ^{over an} reader/showed 30, that gave 83 epidemic years ^{chain} during entire 500- ^{year} ~~summer~~ period of time. Since 1557 the ~~circuit~~ of periods is continuous ¹.

^{the year} 1402 ⁹ was the year of solar activity. The first influenza epidemic of the XV century according to Geser falls in 1403. Into 1414 followed the intensification in the activity of the sun, and influenza epidemics were noted during the years 1411 and 1414. One of the following intensifications of solar activity was observed in 1431; influenza ^{fell within} it ~~falls on~~ 1427.

In XVI century are noted four epidemics of influenza; the predicted maximum of solar activity it was in 1510. Then follow the ^{whose} maximums, the degree of ^{was} ~~the determination of~~ authenticity of which ^{higher} already considerably above because of the meteorological notations,

^{made} produced in Russia and Europe. The nearest ^{maxima} to the enumerated epidemics ~~maximums~~ fall on 1560, 1581 and 1588. Beginning from 1610 there is already more or less reliable material for judging ~~about~~ the activity of the sun because of the telescope, invented by Galileo.

From the comparison of the relationship ~~ratio~~ of the periods of solar activity and periods of influenza in XVII century ^{it} follows that eight ^{rises} ~~uplifts~~ in spot formation were accompanied by epidemics. (Besides second ^{the rise} ~~uplift~~ whose maximum falls ^{on} ~~in~~ 1615).

^{the} Law in the sequence of the epidemics of influenza in accordance with the course of spot-formation process on the sun ^{was even more} ~~with even larger~~ ^{markedly} ~~brightness was~~ expressed in XVIII century, although two periods of solar activity (II and V) they turned out to be completely free ^{of} ~~from~~ epidemics. In XIX century eight periods of nine spot formations ^{were} ~~they~~ were marked by influenza epidemics.

FOOTNOTE 1 The XV century - 1403-1411, 1411-1427,; XVI century ~~is~~ 1510-1557 (the fourth), 1557-1580 (dual), 1580-1591, 1591-1602; XVII century ~~is~~ 1802-1626 (dual), 1626-1642, 1642-1647, 1647-1655, 1655-1675, 1675-1688, 1688-1693, 1693-1709; XVIII century ~~is~~ 1709-1728 (dual), 1728-1737, 1737-1757 (dual), 1757-1767, 1767-1779, 1779-1788, 1788-1798; XIX century ~~is~~ 1798-1815, 1815-1826, 1826-1836,

1836-1843, 1843-1857, 1857-1878, 1878-1889 (dual), 1889-1912 (dual);
XX century ~~is~~ 1918-1926. END FOOTNOTE

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After examining the position of influenza epidemics ^{on} in solar curve, it is possible to be convinced of the fact that the majority of epidemic epochs lie/~~rests~~ ^{rules} on uplifts and incidence/~~drops~~ ^{still} in the curve. Is created impression, as if influenza epidemics ~~have~~ ^{still} all the same tendency to appear between the minimum - maximum and maximum - the minimum ⁱⁿ of solar activity. The beginning of the epidemic, ^{lies} ~~arrange~~ ^{is} located within the limits of maximum - the minimum, ^{or} either lags behind the nearest maximum or it anticipate/leads it on the average by two or three years. Of course, from this it does not follow that all epidemics must be located ~~from maximum~~ to one side or the other, ^{of maximum by exactly} ~~accurately~~ on two or three years, ^{yet} ~~but in~~ this conclusion ^{is} very closely to truth.

It is necessary to say that the attempt to determine periodicity in the course of influenza epidemics in order to forecast them, ^{have} ~~they~~ ^{been} carried out repeatedly. In the distribution of the epidemics of influenza in England for the ^{last} ~~latter~~ of 130 ~~summer~~ years it is possible to ~~reveal~~ ^{detect} 10-year period. The dates indicated

accurately fall ^{within} ~~in~~ the epochs of the maximums of solar activity or ^{within} ~~in~~ the epochs of their ripenings and ^{declines} ~~incidence~~/drops.

Epidemiologists ^{have} noted that approximately ^{every} through each of 35 ^{take} summer/years the influenza epidemics or pandemics accept extremely rigid ^{forms} ~~types~~. (In the activity of the sun Chester also found ^{a period} close to 35 years period, i.e., 33.375 years).

In summation, it is possible to arrive at the conclusion that on the average the period of influenza epidemics is equal to 11.3 years, ^{and} that the duration of epidemics in each 11-summer solar period is equal on the average to four years, and finally, that the epidemics of influenza have a tendency to begin ^{before} ~~for~~ two or three years to maximum or ~~after~~ two or three years after maximum.

The intensity of the epidemics of influenza, apparently, ~~is~~ ^{still has a known dependence to} found all the same ~~known~~ depending on intensity in the activity of the sun. ^{The} Seasonal factor ^{either brings nearer} it approaches or it drives out ^{moves back} the ^{the outbreak} flash/burst of epidemic. Taking into account all this, the physicians can make a forecast/~~prediction~~ about most probable arrangement/~~permutation~~ in time of the epidemics of influenza for certain ^{advance} ~~period~~ forward. Forecast ⁱⁿ the epidemics of influenza ^{is necessary} ~~must be~~ since ~~to prevent its~~ ^{can prevent it} physicians still ~~not can~~. As concerns especially the dangerous infections: plague, choleras and smallpox, to forecast

them there is no need. Science have long tamed these illness/sickness/diseases.

In XIX century the "hunters after micro^{bes}" demonstrated that the medicine was not helpless before the mighty forces of nature.

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People learned to ^{shield themselves} ~~be shielded~~ from many pathogenic microorganisms by special ^{innoculations} ~~grafts~~, creating nonsusceptibility to them - artificial immunity. To the full/total/complete conquest over especially dangerous infections in our country contributed also changes in the social living conditions, the organization of efficient sanitary-epidemiological service. Today the ^{number one} ~~enemies of man number one~~ ^{are} ~~no longer~~ plague ^{or} and not cholera, but cardiovascular diseases, ~~but~~ ^{highway accidents}, cancer, ~~street trauma~~.

Infections ^{have faded} ~~send away~~ into the past and for the majority of people they have purely historical interest. For the biologists besides the historical interest of the ^{the dynamics} ~~dynamic~~ loudspeaker of past epidemics today it serves as the richest actual basis for the construction of serious empirical generalizations. Analysis shows that in appearance and disappearance of epidemics ^{hide} ~~hid themselves~~ the very important laws, which are ^{also} ~~inherent~~, apparently, and in other phenomena, occurring in biosphere.

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Transformation in the unseen
~~Conversions in invisible~~ world.

The biologists in recent years ^{have} (experience^d a the feeling of unusual elevation. The turbulent flow of discovery/openings brought with itself ^{a real} sincere uplift, and each witness of the ^{brilliant} bright scientific conquests with pride realizes himself ^{to be a} ~~by the~~ contemporary of ^a ~~really~~ scientific revolution.

Biology ^{has} ~~was~~ pulled out to the front lines of natural science. ^{for} It ^a long time ^{it} ~~had~~ descriptive character, but after accumulating enormous experimental material, became stricterr and more precise in determinations and conclusions, gradually it mastered the new precise methods, which were utilized earlier only in the region of physics, the mathematicians, quantum mechanics.

ⁱⁿ The experimental study of life ^{has} (today ~~was~~ expand^d ~~developed~~ by broad front immediately in several "measurements^s": at the level of

entire biosphere, ^{parts of it} ~~its parts~~ - the ^{individual} ~~separate~~ associations of organisms, whole organism, organ^s ~~controls~~, ^{tissues} fabrics, cage/cells, cell structures, molecules, even at molecular energy levels. In the opinion of Albert Saint-Georgy, noted biophysicist, Nobel prize winner, soon in biology will appear one additional change - subatomic.

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The ^{new division} ~~young sections~~ of biological science - magnetobiology, radiobiology, space biology - are occupied by research on influence on the processes of the life of the physical factors of the environment, against ~~the~~ background of which the processes are developed: radiation, magnetic field, etc. ^{Because of this} ~~This led to the fact that~~ the concept ^{of} "life", yes even the basic thesis of materialist biology of the unity of the life and ^{environment} ~~medium~~ (even ancient idea about "world sympathy") ^{has} ~~obtained~~ the more concrete/specific/actual content.

^{Look what has happened in just the last few} ~~But so is matter little more than in recent years !~~ ^{And} ~~BUT~~ almost half a century back/ago, when ^{as} ~~in~~ an example of epidemic catastrophes distinctly for the first time formulated hypothesis about the influence of the sun on the processes of life, society was not still prepared for its perception. ~~By~~ ^{was} The first heliobiologists ^{lost} required the stable independence of judgments, and also passionate conviction in their truth in order not to ^{give up half way} ~~throw matter on half-way~~

and, disregarding ^{the} of silent and explicit ^{opposition} counteraction, all the same to study ~~the~~ in earnest experimental check of the obtained empirical generalizations, i.e., to ^{pose} place the first heliobiological experiments. /

By the way, one of the first, who accepted ^{the} "closely-to-heart" thought about the possible effect of the sun and the cosmos on life and even participated in the ^{posing} setting of the first heliobiological and biospace experiments, was K. E. Tsiolkovskiy. ^{The} (Kaluga dreamer and seer, absolutely ^{sure} ^{even} ^{of} assured already then in the validity of the future settling of humanity outside the Earth, ^{was} ^{new} very agitated and worried ^{but} the threat, ~~which~~ is concealed in solar radiation for the future astronauts. K. E. Tsiolkovskiy it ^{was} ^{carried away} ~~were~~ distracted by possibility to experimentally ^{verify's} verify the action of penetrating emission/radiation ^{into} to living organisms. It entered ~~in~~ the discussion of all parts of future experiments.

How to carry out such an experiment in terrestrial laboratory? ^{Is it generally possible?} ~~Is possible whether this generally?~~ ^{There were still} ~~No instruments to account for~~ ^{for registering} solar cosmic radiation ~~still not there were~~. It was necessary to utilize, probably the existing "biological detectors" of cosmic rays, although the scientific literature also nothing said about the responsiveness of living tissue ^{to} ~~for~~ cosmic radiation. What will occur, if we deprive ~~of~~ living tissue ^{of} "secondary particles"? Will

change its normal functions? Judging by the comparisons of the development of epidemic process and solar activity the sun frequently ~~it~~ contributed to epidemic explosions.

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But did act it directly or indirectly through the changes, produced in biosphere? Did ^{it} affect ~~it~~ microorganisms, i.e., on pathogenic ^{origin} principle, or it did weaken the shielding forces of man?

All these and many other questions ^{had to be solved.} it was in prospect ~~to solve~~. They appeared one after another. From their ^{chain} circuit for a beginning it was necessary to snatch out at least one ~~component~~/link. After long speculations the model of the experiment began little by little ^{to} be drawn. ^{It would be simplest} ~~Most simply~~ it is available, it seemed, to search for the proof of the existence of solar effect "from the ^{opposite} contrary", i.e., to trace, as ^{how} ~~affects for~~ the living objectives ^{are affected} not an increase, but a sharp decrease in the intensity of penetrating radiation.

^{With the cooperation} During the assistance of K. E. Tsiolkovskiy ^{and} to A. L. Chizhevskiy it was possible to ^{against the lead} mine necessary for experiments lead and to ^{matter} approach to the point. From thickened lead plate/~~platforms~~ was constructed ^q the chamber - house in the form of cube. This form provided even braking ^{dampening} in the thick layer of lead of the cosmic rays,

coming from different directions, In the vicinity of
 going with different sides, a control wooden frame of the
 constructed the same size/dimensions the control wooden house, covered
 on up from all sides by the layer of the earth/ground 75 cm. thickness.
 Both chambers were covered by the two-sloped surface wooden shed, covered
 with roofing paper, protecting it from rain and direct/straight sun rays.

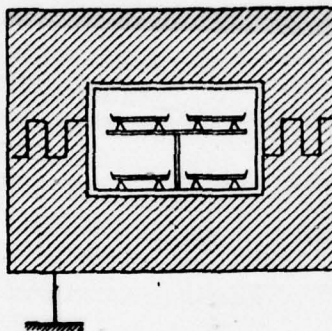
The procedure of experiments was carefully developed.

Experimental research on the effect of solar activity on the world of
 bacteria was carried out simultaneously on saprophytes - the harmless
 for a man microorganisms, harmless to man which lead a
 life, and the parasitic forms, which adapted to existence because of
 multicellular organisms.

Furthermore, in experiments were utilized the culture of living
 tissue (small pieces of cancerous swellings in feed
 solution/opening), the germinating seeds of plants. All these
 specimen/samples in different periods were placed inside the lead
 "shelter", shielding them from penetrating radiation, and the same
 specimen/samples were placed into wooden house. In lead and wooden
 houses were thus created different "space conditions". It was
 to assume, as will answer to the stay under unusual "space and solar
 conditions" the fabric of cancerous swelling. But the fact that the
 bacteria and plants under these conditions will bring themselves
 somehow otherwise, the experimenters barely doubted.

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Schematic of the chamber, in which were carried out the first experiments on heliobiology by A. L. Chizhevskiy.



Almost all the numerous invisible bacterial population of our planet, as is known, the scientists are ^{classified in} related to the phytosphere - vegetable world. But ^{at the same} by ~~that~~ time already it was proved that the vegetable "microcosm" of planet undoubtedly was sensitive to changes ⁱⁿ on the sun. By research on the effect of the fluctuations of solar activity on increase in the productivity, the flowering of plants ^{has been} thus far ~~was~~ occupied ^a the whole pleiad of the scientists: K. Flannarion, F. Nansen, A. Douglas, F. M. Shvedov et al. Douglas and Shvedov investigated the relationship/ratio between the degree of the strength of the spot-formation process on the sun and the ^{growth} increase of ^{forests} ~~wood~~. Douglas measured with an accuracy to ^{within} the hundredths of millimeter the thickness of rings on cuts of the giant sequoias of south California, which ^{could} it is possible ^{be} rightfully to call ^{as} ~~name~~ the "earliest memory units", storing the information of 4000-year antiquity. On the cuts of sequoias clearly it was ^{outlined} ~~drawn~~ either eleven year cycle of solar activity or ~~its~~ multiple values. ^{of it.}

^{Being} Based on these and similar investigations, it was possible to foresee that the respiration of the sun sensitive ^{ly} perceives entire/all phytosphere of planet, including invisible. Unlike the more complex heterotrophic organisms, which feed ^{on} ~~by~~ plants or animals ^{are} and ^{from long} freed ~~by~~ evolution from "slavish solar dependence", the

autotrophic plants, which ^{assimilate} directly ~~master~~ solar energy, are located literally in solar ~~flame~~ ^{captivity}

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The result of three-month experiments turned out to be not only surprising, but also convincing !

Under the protection of thick lead walls noticeably was accelerated an increase and the multiplication in the ~~cage~~/cells of plants and microorganisms, even ^{tumors} ~~swellings~~. An especially ^{marked} bright difference was ~~reveal~~/detected in the rate of growth of the colonies of a series of virulent and pathogenic microorganisms. The histological analysis of cancerous ~~cage~~/cells showed that under lead shield they increase faster than without it. The seeds of a ^{number} ~~series~~ of ^{cultivated} ~~cultural~~ plants (for example, pisolitic) also they showed high energy of intergrowth under lead walls.

Although the experimental conditions did not make it possible to distinguish, "where ^{were the} strictly solar, ^{and} but where ^{the} other space effects", it was solid establish ^{ed} installed that, in the first place, penetrating ^{on penetrant} the emission/radiation reaches directly ^{the} biosphere ! And, in the second place, that it produces ^a the suppressing action on ^{the} increase and multiplication of living ~~cage~~/cells.

So, experimentally it was possible for the first time to explain the degree of sensitivity of different living ~~cells~~/cells to space and solar effect in the biosphere of the Earth.

The described experiment in our time seems primitive, just as the applied in it chambers in comparison with the chambers, used in radiobiology today. But indeed since then ^{have passed} ~~pass~~ forty ^{here} ~~summer~~/years... Unfortunately, the experiments, ~~about~~ ^Q which it is described, they continued for a short time. But as ~~their~~ natural continuation later, in the 40's, served the observations of Sergey Timofeyevich Vel'khover, ^Q ^{was the director in} physician, who led into those years the clinic of infectious illness/sickness/diseases in Kazan.

S. T. Vel'khover interested himself in the effect of the sun on the course of infections and ^{he} ~~it~~ decided to verify itself "solar hypothesis". For this purpose ^{he} ~~it~~ selected the exciters of diphtheria - Loeffler's ^{bacillus} ~~rod~~ - and ^{bacillus} ~~similar~~ ^{to} them, "as two drops of water", but completely harmless ^{the} ~~diphtheroid~~ Corynebacteria. ^{the} Dangerous and inoffensive bacteria differed under microscope only one special feature/peculiarity - different coloring. The contained in Corynebacteria volute ^{granules} ~~grains~~ gave special color reaction - "metachromasis". Grains reddened under the effect of methylene blue.

This phenomenon first was amplified, then it weakened depending on the state of Corynebacteria.

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To distinguish diphtheroids and dangerous diphtheria rods is possible only with the aid of coloration. In other respects they are ^{as alike} similar as the twin counterparts. This is explained by the facts that pathogenic microbes and saprophytes - the "native brothers", they indisputably have the common/general/total ancestors. Furthermore, one and the same microbial ~~case~~/cell behaves completely differently under different conditions of the medium....

^{are in constant}
We ~~constantly neighbor~~ with the world of bacteria, but infectious illness/sickness/disease is only a very unpleasant episode in our life. How to explain that the countless armies of dangerous microbes do not devour us alive? Apparently, by the ability of our organism to resist contamination, and also by the facts that the pathogenicity and other properties of bacteria are changed under the effect of many ^{factors} ~~reasons~~, majority of which, for sure, to us are still unknown. For example, it is possible to introduce under the skin of guinea pig the most dangerous bacteria, ^{which causes} ~~causing~~ gas gangrene, and ... no gangrene ~~there~~ will be ! But if conditions somehow change, the same microbe will kill mouse or ^{guinea} (pig) !

S. T. Vel'khover establish^{ed} ^{an} important fact: the ^{the} redder ^{the} volute ^{granules} grains of diphtheroids, ^{the} ^{they are} thereby they are less toxic, ^{and the more} "more saprophytic". After learning about the conclusions of the statistic studies of A. L. Chizhevskiy, S. T. Vel'khover began to search for the dependence between the degree of their colorability and the cyclic activity of the sun. It turned out that the diphtheroids in the years of the maximums of solar activity sharply redden, they become seemingly still "more saprophytic", sharply they differ ^{more markedly} from the dangerous exciters of illness/sickness/disease. (Diphtheria ^{bacillus} ~~rod~~ of generally ^{does not contain granules} volute ~~grains~~ ^{does not contain}). ^{Conversely, just as soon as} ~~Na-protiv~~ ^{in order that} the activity of the sun would decrease, as immediately Corynebacteria ^{would} turn pale, i.e., ~~everything more~~ ^{more} begin to resemble ^{more} the exciters of illness/sickness/disease. This resemblance directly is dictated by the sun ! At the same time the physicians and the statisticians everywhere noted in the periods of the minimums of solar activity an increase in the diseases ^{of} ~~by~~ diphtheria. ^{they} So under microscope ^{they} ~~was reveal~~ /detected that which initially was revealed statistically.

This is what wrote S. T. Vel'khover in one of his letters to A. L. Chizhevskiy: "... I conduct ^{ed} systematic bacteriological observations of diphtheria.... During ^{processing of the} ~~the treatment of~~ material I

arrived at many ~~struck~~ ^{striking} conclusions.

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In your interpretation of diphtheria as epidemics, there are two ~~torque/moments~~ ^{factors mirror image phenomenon}: ~~specularity~~ (i.e. a decrease in diphtheria during uplifts of solar activity and vice versa -. author's note) and the ~~delay~~ ^{lag in} of diphtheria maximum in comparison with solar maximum. Your "principle of ~~specularity~~" ^{mirror image}, obtained statistically, completely unexpectedly was confirmed ~~to~~ ^{by} me directly under microscope. I decided to search for "this ~~specularity~~" ^{mirror image} and through three experiments understood that I deal with surprisingly precise phenomenon".

It is unusually interesting that the reaction of metachromasis, ~~about which goes the speech~~ ^{we are referring to here}, is observed in Corynebacteria for 4-6 days before the appearance of bright flash/bursts and spots on the surface of the sun. Thus, microorganisms seemingly forecast, ~~as it were,~~ ^{as it were,} previously changes in the "solar weather ...".

How often historians of some field of science, analyzing half-obiterated rough drafts or leafing through the yellowed pages of a manuscript, are amazed by the almost enigmatic coincidence with which one fact or another or one idea or another came to the minds of different people.

Without ~~knowing~~ nothing about professor A. L. Chizhevskiy's experiments, one additional researcher - ~~the~~ ^{an} instructor of Tomsk Medical Institute physician Peter Mikhaylovich Nagorskiy - approximately in the same years began to perform an experiment, which ~~very resembled~~ ^{much} to the experiments of Chizhevskiy.

Lead armor this time hid from solar and cosmic rays not only microorganisms. Nagorskiy ^{established how a} verified, ~~as acts the~~ stay in the chamber ^{affect} on the growth of young rats, on the intergrowth of the tubers of potatoes, the regeneration of tail in tadpoles, the healing of wounds. ^{He dissected} It cut hydromedusae, planaria, Daphniae, tadpoles. Every day ^{by} it followed the processes of regeneration - restoration/reduction, ^{the} the damaged ^{tissues} fabrics. P. M. Nagorskiy obtained independent of A. L. Chizhevskiy ^{to} the results, similar on those, about which ^{home} it was already ^{been} described. In lead chamber the tails in tadpoles increased considerably faster than under normal conditions, ⁱⁿ on freedom. The colonies of microbes under screen grew, it was amplified the pigmentation of bacterium-saprophytes. P. M. Nagorskiy, just as A. L. Chizhevskiy, drew the conclusion that even the partial limitation of the inflow of solar or cosmic radiation amplifies the vital activity of microbes and ^{Protozoa} simplest. In other words, that the ^{living} ~~space living~~ ^{Cosmic} conditions on the Earth for them hardly ever optimum.

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But if this ^{were true} ~~probably~~, then it means medicine / could find and reproduce on the Earth in biosphere ^{altered} and ^{and} the changed, unusual for us space conditions, ^{and} also, with their aid to accelerate, let us say, the

healing of wounds.

His doubts, dreams, searches, ^{and} experiments P. M. Nagorskiy ^{took} removed to the ^{judgement} ~~law~~ court of the associates. "Professor physicist Sokolov and ^{his} professor of astronomy Gorachev they aided me to create the drawings of the biotrons, required for this work, recalls in ^a letter Peter Mikhaylovich Nagorskiy - But, unfortunately as early as ^{with my first presentation on this subject} in 1930 with the ~~first~~ my appearance in regard to this opponents Holberg, Peyzner, Toroptseva and others groundlessly call^{ed} ~~named~~ the most obvious facts "empty fabrications". I assumed that my opponents ^{had} ~~led not~~ the ^{all} ~~evil~~ will, but simply lack^{ed} ^{of the} understanding, and therefore I ^{went for support} ~~left after reinforcement~~ into Moscow to biophysicist academician Peter Petrovich Lazarev. ^{He} ~~It~~ willingly became acquainted with the abstract of my work and proposed ^{that I come to him in} ~~to visit it after~~ two days, but ^{he} ~~abstract~~ ^{he} ~~it~~ kept.

^{returned to him} When I ~~was to it, it,~~ instead of advising, ^{a consultation} ~~Seated me into~~ ^{drove to the} ~~automobile and it brought into~~ spacious, ^{book-lined} ~~set by the books~~ the working office of the scientist, with whom I was not ^{acquainted} ~~sign~~. Master ^{The latter} ~~accepted us~~ very affable, attentively listened, ^{ascertained} ~~found that I stand in~~ ^{was on the} ~~accurate~~ ^{right track} ~~ways~~ and persistently ~~it~~ recommended to continue work. "It can lead to great discovery/openings" ! - said he. This person literally stupefied me with his great knowledge, the latitude of view. I left ^{with bright} ~~from it by the~~ clear and winged large hopes.

- who ^{he} ~~it~~? - asked I in Lazarev.

- yes this Vladimir Ivanovich Vernadskiy, ^{came by} ~~followed~~
answer/response.

Only then I learned, who gave me in this relatively small time,
so much" 1.

FOOTNOTE 1 From letter of P. M. Nagorskiy to Yu. G. Shishina (1965).
END FOOTNOTE

What was obtained finally from these experiments? The
authoritative board, which consisted of the serious scientists noted:
"under conditions of lead chamber P. M. Nagorskiy observed the
intensification of regeneration in tadpoles, the intensification of
~~the~~ pigmentation of bacterium-saprophytes, the acceleration of the
healing of wounds, an increase in the virulence of the rod of
Grigoryev-Shig (exciter of dysentery). But in connection with the
fact that the chamber does not have measurement-^{and monitoring} ~~supervisory~~
equipment, ^{we} ~~it~~ cannot ^{say} be said, ^{why} ~~because of what~~ occurred ~~note~~ by the

author of change
changes noted by the author.

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Board recommends to docent P. M. Nagorskiy mission in Pulkovo for a consultation with B. M. Rubashev et al. regarding improvement of chamber" 1.

FOOTNOTE 1 Ibid. END FOOTNOTE

Nagorskiy fulfilled the wishes of board. ^{He} ~~It~~ discussed possibility to improve work with many well-known scholars. They all approvingly answered ^{responded to} ~~about~~ the direction of the investigations: the astrophysicists V. A. Krat and biochemist S. Ye. Severin, biophysicist G. M. Frank and many others. "In spite of this," with bitterness ^{concludes} ~~consists~~ P. M. Nagorskiy, "I ^{nevertheless} ~~so~~ and it could not continue my experiments. ^{Tomsk Medical Institute refused to help me. And so much could have been accomplished if} ~~But as much could already be made, if~~ Tomsk opponents ^{had not been able} ~~did not find possible~~ to call ~~name~~ the established, installed and reliable facts "my empty fabrications". Previous ^{by obtained information} ~~already mine by the~~ ^{determined by} ~~medicine of the information about organism~~ ^{on} in many respects are created on the basis of idealistic ^{concepts} ~~representations~~. They frequently reduce the concept ^{of} "environment" to temperature, humidity,

pressure.... But this not thus.

Are necessary the experiments, which would reveal/detect/expose all complex ~~communication~~/connections of living organism with external world" 2.

FOOTNOTE 2 Ibid. END FOOTNOTE

In the photographs, ^{taken} ~~conducted~~ many years ago by P. M. Nagorskiy in the course of experiments, ^{was} ~~is~~ observable the surprising result of the first biospace investigations, which now is of scientific interest! ^{whereas} ~~if~~ 40-50 years ago the question concerning ~~communication~~/connection between the microorganisms and the sun ^{to} seemed many that which was ^{abstract} ~~torn from~~ practice, ^{and} (purely theoretical, ^{now} ~~but now this~~ ^{it} is the problem of day. When man is prepared for flight into Cosmos, where ^{a/ being} ~~living~~ at each step ^{must be} ~~pitch~~ ^{guard} ~~are~~ on the watch ^{for} unforeseen dangers, it is first of all necessary to explain, ^{to what} ~~in which~~ ^{extent} ~~measure~~ does shield astronaut from the penetrating emission/radiation the armor of spacecraft, under which conditions ^{he} ~~it~~ can ^{from} ~~emerge~~ the ship, etc? ^{helpful in answering} ~~To answer~~ ^{are} all these questions ~~help~~ experiments on unicellular and multicellular living organisms.

In 1960 the collective of the Soviet scientists, led ^{by} N. N. Zhukov-Jakovym-Varejniko, studied ^{the} ~~the~~ complex of ^{studies} ~~works~~, connected with preparation for the space flight of the "microastronauts" - living microorganisms.

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Before sending ^{them} into kosmos, ~~then~~ they subjected ^{them} to the preliminary tests: they ~~shook~~ ^{shook them} on vibration tables, they irradiated ^{them} in order to explain the degree of the effect on ~~of the~~ bacteria of those physical effects, which ~~they will be met~~ ^{are encountered} in kosmos. These experiments establish ^{ed} ~~installed~~ ^{that} the sensitivity of bacterial ~~cells~~ ^{cells} to the penetrating emission/radiation varies ^{over} ~~between~~ very wide limits: from ~~the~~ ^a tenths of roentgen to tens ^d ~~thousand~~ ^{of} roentgen. From microorganisms ^{when decreased} ~~with~~ it is possible to create whole living measuring system - the scale, which more precise than any instrument will record variations at radiation doses.

Indirectly experiments on the microastronauts confirmed conclusions of A. L. Chizhevskiy and P. M. Nagorskiy. - Microorganisms are so ~~such~~ sensitive, that, even ~~being~~ on the Earth, they ~~there is also~~ ^{respond to} no doubt ~~answer~~ the fluctuations ⁱⁿ of space conditions, perceive all hues of "solar weather". These experiments were carried out half a century ~~back~~ ago. But it would be all the

same wrong to lose them in the flow of later discovery/~~openings~~ and
to ^{lose} ~~betray~~ to oblivion those modest investigations, which marked the
^{very} beginning of ~~quite~~ space biology.

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Living clouds.

The member of VASKhNIL (All-Union Academy of Agricultural Sciences im. V. I. Lenin) entomologist Nicholas Sergeyevich Shcherbinovskiy loved and knew the east ^{at least a well and} ~~not worse~~, but perhaps it is better than many specialist-orientalists. ^{He was fluent in} ~~It freely managed~~ several eastern languages, he spoke and he wrote in ^{Pharsi [Farsi]} ~~Pharsi~~ a quatrain ^{couched} ~~exposed/persistent~~ in the ~~better~~/best canons of classical eastern poetry.

Asia was for ^{him a} ~~it~~ the "native ^{home} ~~house~~". ^{He} ~~It~~ ^{it very much} ~~it very~~ loved ^{and knew} ~~and knew~~, because more than thirty ~~summer~~/years of life it dedicated to research on the most evil and dangerous ^{destroyer} ~~wrecker~~ - locust, for which ^{his} ~~the~~ associates ^{so} ~~into~~ joke called Shcherbinovskiy the "king of locust".

^{the} Beginning to N. S. Shcherbinovskiy's scientific work ^{was an} ~~placed the~~ extraordinary accident, which ^{occurred} ~~played~~ on 4 May, 1929, in the region of

Kushki - the ^{extreme} ~~quite~~ south point of the Soviet boundary. ^{On} During this day unexpectedly ^{the} sky ^{was covered by} ~~shut the~~ dark clouds of many kilometers. They were born from Afghanistan at a high speed, eclipsing the sun and entire horizon ~~level~~.

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N. S. Shcherbinovskiy (1950's)



When clouds approached ~~themselves~~, ^{it began to} of them began to pour the "rain" of large yellow, long-legged insects. The unexpected "invaders" ^{quickly} ~~non-linering~~ attacked fields and gardens, eliminating by their powerful jaws entire vegetation. Sowings and trees perished after several hours. The deposited insects ^{jumped} ~~skipped~~, ^{up} crawled to trees, the walls of houses, ~~to~~ each other. Females infected ^{the} soils ^{with} by eggs ^{for} to thousands of hectares around. This was the invasion of locust.

^{The} Alarming cry "locust" ! since olden times throws ~~downplunge~~ people into ~~the~~ horror: "^{and here} moved mighty army. It can cover entire earth/~~ground~~ and devour everything that there is on the Earth. When ^{taken off} it ~~is dug~~ in, grows dim the sun and star¹ ^{their shine} they lose ~~its~~ flare. ~~In it~~ ^{It has} the head of lion, the neck of bull, the breast of horse, the wings of eagle, the belly of scorpion, thigh of camel, the head of ostrich, the tail of snake", so is described the locust in ancient Arab manuscript. Similar to the flash ^{outbreaks} ~~bursts~~ of epidemic the ^{hordes} ~~coatings~~ of locust since ancient times bore the character of authentic spontaneous/elemental catastrophes.

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From Argentina to Canada, from Australia to Mongolia, from China

to Portugal periodically spread impinging unexpectedly from the unknown distances ~~of the horde~~[§] of the different types of this insect. The enormous flocks of locust suddenly ~~were omitted to the there is~~^{descended on the once} no time magnificent oases of Egypt and Palestine, after which from date palms and green ~~souings~~^{plants} on the Earth remained only the gnawed shafts and stems. The efflorescent valleys of the Nile and Tigris, the Ephrates and Indus locust periodically converted into lifeless deserts. Flying hundred of kilometers above fields and seas African locust periodically it invaded into Russia.

Of ten thousand different contemporary forms of locust insects - the earliest inhabitants of the Earth, the impressions of ancestors of which ~~find~~^{have been found} in the clay ~~partings~~^{strata} of coal, ~~which were being formed~~ more than 250 million years ago, only 481 forms is encountered within the limits of our country. ~~From~~^{of the} locusts are especially dangerous so-called gregarious forms, whose larvas form enormous accumulations - swarms and the winged individuals form innumerable flocks.

Voracious swarms by "foot course" ~~are moved~~^{on foot} from place to place ~~by~~^{more} multimillion masses, and after ~~inspiring~~^{taking wing}, ~~leave into~~^{embark on} hyperdistant flight ~~passages~~⁹, sometimes more than two thousand kilometers. The gregarious locusts include the Asian migratory locust, that is encountered in the Soviet Union as well as the desert locust, ~~the~~⁹ native of Asia and Africa, who flew in 1929 ~~against~~^{to} Kushku. ~~Thus far~~^{Before this}

^{flight}
~~coating~~ the Soviet scientists about African locust knew only by
 hearsay, ^{from} ~~in~~ the dried museum specimens ¹ ~~samples~~ and information ~~made of~~
^{from} foreign scientific literature. In Russia was known another gregarious
 form of locust - Asian. Asian locust since olden times nested in cane
 brushwood ^{marshes} ~~the fluxes~~, bordering Balkhash and other lakes of
 Kazakhstan, in the lower reaches of the river of Syr-Dar'ya,
 Amu-Dar'ya, in the coast of Aral sea, in the swampy mouths of the
 Volga, Terek, Kuban and the lower reaches of the river Manycha.

Its life is connected with ^{the} reed - the favorite food of larvas
 and adult locust. But with [↑] the deficiency of forage locust does not
 shun ~~and by~~ the straw roofs of rural cottages, even ^{clothes drying} ~~by the~~ dried on
^{clothes lines} ~~carde linen~~. When ^{marshes were inundated by} ~~fluxes~~ it poured powerful flood, locust ^{stayed} ~~was held~~
^{on} ~~during~~ islands and elevations.

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Into arid years the ^{marshes} ~~fluxes~~ were converted into the efflorescent
 meadows and ^{were able to reproduce abundantly} ~~before~~ insects it ~~was open/disclosed the possibility or~~
^{and resettle} ~~abundant multiplication and settling~~. Sometimes locust came out to
 fields and, having ^{only} ~~only~~ destroyed thousands of hectares of ^{plants} ~~sowings~~,
 again returned to the native places.

The mass multiplication of Asian locust in tsarist Russia was

considered phenomenon usual. Its hungry armies flew ^{even as} so far ^{as} even to Kazan and Tula, ~~the~~ ^{depriving} ~~the~~ ^{the} lichen of the peasants of the last/latter piece of bread. In 1859 ^{only} (in) four provinces of south Russia the locust destroyed grain crops ^{of} to a million of rubles. This is how describes eyewitness one of the ^{attacker} ^{on a} ⁱⁿ coatings of locust ^{to} station ^{to} the Makar'yevku of Kharkov province in 1880: "first August from ^{the} locust literally faded the sun and ^{here} they came twilight. The powerful hiss ^{whistle} of ^{from a} the specially open steam-locomotive whistle forced it somewhat to stand ^{the} ^{3.56} aside, but it all the same was ^{descended} ^{on an [dessiatina: 2.7 acres]} dropped to the earth and covered with itself the space of ^{on an} ^[dessiatina: 2.7 acres] dessiatines into ^{up to 44 deep} five hundred, by layer ^{to fourth}. Its mass was so was great and dense, that where it was necessary it to cross ^{coach} ^{by crew} horse ^{moved with} with difficulty they ^{conveyed} ^{through} accurately ^{on} large deep ^{of Lugovaya} contamination. Almost the same occurred in village ^{meadow}. The vicinities of village, village itself, all living creatures in it appeared in the pitch-dark dark. Were not possibilities to see, ^{who was there and what they were} where ~~who was located~~ and that it ^{done} made. Population soon it realized, that ^{there had} arrived the new misfortune and ^{that it was} necessary to save ^{in any manner possible} as and ~~how~~ it ^{from the} hit, the scanty harvest of rich in the calamities of 1880. Into one instant was formed ^{men on horseback} the militia, in which took part horse, and ^{on} foot, old and ^{young} ^{small}, with weapon like bells, spits, basins, cast iron, in a word, ^{everything} entire metallic, that ^{made} published noise and sound. ^{there was also some} It did not manage without shooting. ^{The battle} Breakage lasted until night itself....".

But by such primitive methods as ^{clapping} clapper, by ^{broom} the besoms and the ^{swelling} buzzing of insects, by the digging of ^{many} multi-verst furrows, to attempt to conquer locust, of course, was thoughtless.

The last/~~latter~~ most terrible ^{outbreak} flash/burst of the multiplication of Asian locust, which took Kuban, Stavropol'ye, Lower Povolzh'ye, occurred in 1921. If locust ^{had} ~~was~~ not then ^{been} ~~here~~ destroyed, then it ^{would in one sitting have} ~~would~~ ^{of} ~~into one appearance it would destroy~~ 96 million t of green forage.

The first in the world extensive work on the destruction of Asian locust with the aid of aviation were ~~expand~~ ^{sprayed} developed in 1925 in our country. Poisons were ~~sputtered~~ ^{sprayed} above the ^{marshes} ~~in~~ ^{of} ~~impervious/impassable swampy fluxes~~ of the river Kum'.

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^{It was more difficult to cope with} ~~More complexly it render/showed to manage~~ the African desert locust, that arrived flying from Indian, Arabian and African deserts.

The Soviet scientists clashed for the first time with it in Kushke ⁱⁿ 1929. It was assumed earlier that the locust dwells in Africa, partly in India and that its constant foci are found in south Iran. When the ^{outbreak} flash/burst of the mass multiplication of locust did encompass ten ^{Countries} ~~states~~, it turned out that the scientists plainly ^{did} ~~do~~

not know even, where ^{it} ~~she~~ constantly does dwell, how ^{many} much it does give generations per annum, why does appear the spontaneous/elemental dispersion/divergence of its flocks? The intrusion of the "sharp-toothed army" of locusts into the Soviet Union in 1929 (it ^{reached} ~~achieved~~ Aral Sea and the thresholds of Pergana valley, after ^{striking} ~~infecting~~ one and one-half million of ~~the~~ hectares of the earth/~~ground~~) required deeper research on this form of locust.

~~Went~~ At that time the Soviet specialists ^{went to} in Iran, whence began locust invasions. ^{Among the} ~~In the number of~~ scientists was young Soviet entomologist Nicholas Sergeyevich Shcherbinovskiy. ^{At that time he} ~~Then~~ scientist did ^{never dreamed} ~~not think~~ that ^{they} ~~subsequently~~ for him it ^{would be} ~~is~~ necessary to dedicate to the locust of decades of life, to travel all over ^{on} in camels and ^{cars} ~~machines~~ thousand of kilometers in the deserts of Iran, India, Arabia, Iraq, Pakistan and the countries of South America.

The Soviet researchers first of all ^{posed} ~~placed~~ before themselves number of questions. Whence and why did occur the intrusion of the flocks of locust to the territory of the Soviet Union? Can locust be based in south Turkmenia and for a long time? Is it possible to await the repetition of ^{the attacks} ~~its coatings~~? Where it generally does dwell? How many generations are developed in it during one year? ^{What factors are} ~~Which reasons~~ ^{responsible for} ~~to produce~~ its mass multiplication and the dispersion/divergences of flocks ~~to~~ thousands of kilometers to north?

English entomologists asserted that the locust in Iran ^{was} not migratory, but constantly dwells and multiplies in south provinces and in Kermanskikh deserts. N. S. Shcherbinovskiy expressed entirely another opinion. According to him in Iran there are no constant foci of the inhabiting ~~of~~ locusts - this ^{is a} typical tropical insect. In the years of the mass ~~flash~~ ^{outbreaks} ~~bursts~~ there can be located only ~~time~~ temporary the active foci of its multiplication.

^A ~~The~~ ^{of} checking on the spot showed that in Iran really/actually there are no foci of the constant inhabiting ~~of~~ locust. This country serves for it only as ~~time~~ temporary refuge in spring. The flocks, which ^{took wing} ~~inspired~~ from March until May in the western provinces of Iran, fly away in May-June to the east, into India, into the zone of precipitation of summer monsoon rain.

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Shcher ^{was absolutely right}
N. S. ~~binovskiy~~ ~~render/showed~~ ~~completely rights~~. Desert Dzhaz-Murian ~~(erroneously was)~~ called the place of the constant inhabiting of locust. Furthermore, Shcherbinovskiy noticed ^a the most important fact. ^{he} ~~It~~ focused attention on the fact that ^{great} grandiose "crusades" of locust occur periodically, after definite intervals of

time.

Occurrence of cycles in the multiplication of locust exists, of course, from immemorial times, but, however it is strange, ^{that} this earlier ^{was} did not note^d. But meanwhile, for example in XIX century, ^{there} locust flash/bursts ^{locust outbreaks} were exactly nine. And in our century already ^{we have} it is counted six ^{outbreaks} flash/bursts: into 1900-1904, 1912-1916, 1926-1931, 1940-1944, 1950-1958. In 1958 were begun the sixth, that was being amplified yearly, including 1962, when locust "filled up" according to of N. S. Shcherbinovskiy, Iran and Afghanistan, having slightly ^{touching} caught South Turkmenia.

In XX century, as in past centuries, these ^{outbreaks were} flash/bursts ^{are} distinguished by, surprising regularity. The invasions of locusts are repeated on the average ^{of every} each of eleven summer/years. ^{And it is} But ^{at} indeed precisely with such intervals ^{that} gaps are repeated in south deserts ^{the} and years with abundant rain. ^{And} But this in turn, is connected with cyclic variations in the activity of the sun.

After comparing the ^{life} cycles of the ~~life~~ of African locust with the periodic activity of the sun, N. S. Shcherbinovskiy it established that ^{reproduction} in the multiplication of desert locust ^{the} ^{there also} occurs the sufficiently strict occurrence of cycles. Each ^{reproductive/proliferation} cycle of the ~~multiplication~~ of locust covers on the average of 10-13 summer/years.

The maximum of the ^{reprod/proliferation} multiplication of locusts comes, as a rule, to the fourth - the sixth year after the beginning of cycle of solar activity, ^{after which the} ~~then flash/burst~~ ^{dies down} goes out. Gradually is reduced the territory, colonized by flocks, ^{fade out} fade the time/temporary foci of multiplication, disappears gregarious form. Somewhere only glimmer ^{of} the small, scattered foci from separate insects. ^{the} Gradually biological activity of insects again grow/rises. Foci are converted into ^{hordes} flocks. Abundant small ^{hordes} herds and ^{hordes} flocks begin to plot/deposit the masses of the ^[eggs?] money boxes, from which appear the larvae of already typical gregarious form. In locust occurs sharp uplift ^{of} vital curve.

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Finally, the formed enormous, voracious, impetuous flocks, which reach weight ^{of} in tens of millions of tons they fly so far to the northern limits of the time/temporary multiplication of locust in Asia or Europe, to zone of the equatorial forest/scaffolding in Africa and southeasterly India. There locust multiply cannot, natural conditions do not correspond to its necessities. Cycle concludes with specific quantitative depression. ^{its} ^{is} Duration it approximately three - five ~~summer~~/years. Then begins new wave....

N. S. Shcherbinovskiy wrote that in a deep antiquity, for centuries prior to the beginning of our chronology, in the Chinese, Mongolian and Tursk peoples, who populated steppes and deserts of Eastern Asia, there was a 12-^{year}~~summer~~ cycle of chronology. ~~its~~ Each of ^{its} years was called one animal or the other: the year of cow, horse, ram, panther, hare, even mouse. Therefore the historians and the ethnographers correctly consider that the cycle of "mushel" must have the material basis, connected with economics and mode of life of the ancient nomads, ^{who} ~~which~~ passed over from ^a the hunting structure of life to nomad cattle breeding. Cattle was the basis of the existence of these peoples, pasture - immense and inexhaustible. Mode/conditions of weather, ^{the amount} ~~a quantity~~ of winter and summer precipitation and temperature were extremely unstable. At times hot droughts were burned out from the early spring of grass and ^{then} it began a "dzhut" ^a "dzhut" - the mass case of the being famished animals. Centuries ^{"dzhute"} back/ago nomads established that especially powerful ^{jutes} were repeated ^{every} each of 11-12 ~~summer~~/years. Hence conceived itself the idea of ^{an} animal calendar cycle. The most severe year was considered ^{the} "koyan" - the year of hare. Especially disastrous were the ^s "koyan" ^{every} through each of 36 ~~summer~~/years. (Recall ^{the} about 36-summer cycle of solar activity). People called them "ul'kun-dzhut". In such years ~~disastrous~~ 60o/o of horses, the half of the live-stock of sheep,

970/0 of goats, 500/0 of camels ^{perished}. Almost half died out ^{of} many camps of nomads. And since during "ul'kun-dzhut" in steppes died out ^{saigas} saygaki, kulany ^(wild donkeys), Gasella subgutturosa, argalis, bustards, partridges, pheasants, the foxes and other representatives of animal kingdom, the starving population began to catch ~~trap~~ ^{fish} with hands fish in the shallowed steppe lakes. ^{Perhaps this is the reason that} Not therefore ~~whether~~ one of the years of mushelya is called "ryba"? ...A century ago nomads knew how to foresee heavy ^{Koyans} "koyany" and disastrous "ul'kun-dzhuts". But contemporary science proves to be still ~~is~~ powerless to foresee the possibility of the mass multiplications of locusts, water rat, ^{rustic shrews - not moths} granular scoops, shield bug.

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Meanwhile the expedition of the Western-Siberian branch of the Academy of Sciences of the USSR they established that the multiplication of these wreckers in Barabinskaya steppe has ^a marked ^{cyclical nature} ~~occurrence of cycles~~ ¹.

FOOTNOTE ¹ From a report by N. S. Shchbinovskiy at the All-Union conference on the problem of solar activity (1964). END FOOTNOTE

The tasks of science are reduced at present in order to ~~previously foresee~~ ^{predicting}, when can be begun the new multiplication of locusts and other insects in their native foci.

Thus, it proves to be that the occurrence of cycles exists not only in the multiplication of locust. To similar cycles of specific depression and violent multiplications are ^{also} ~~subjected~~ other insects. In the cotton belt/zone of the USA, for example, spontaneously multiply sheet, the bollworm of Alabama ~~through~~ ^{by the time} every 22 years eliminated ^{destroying crops} sowings in many states, since ~~to time~~ ^{it had been} of its new mass invasion ^{usually they} forgotten.

But in the beginning of the 50's of our century American entomologists, ~~being~~ based on timely forecast ~~predictions~~ ^{by the time}, met the next takeoff of multiplication ^{boll weevils} scoops fully armed with chemical agents. Harvest was rescued. ^{Thus} So the biologists ^{were able} ~~knew how~~ to predict ^{ahead of} after several summer/years forward ~~next flash~~ burst.

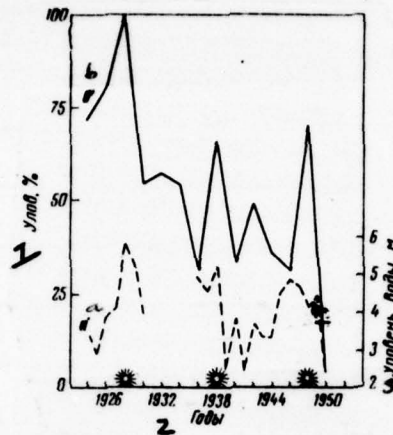
The Soviet entomologist P. I. Marikovskiy, whose thoughtful observations and stories about insects are well known to many naturalists, ~~it~~ established that in the steppes of Kazakhstan and Western Siberia the toxic spider-karakurta ^[Kirghizian "black death" spider] multiply periodically. Minor cycles in this case are ~~alternated~~ ^{in life} with large twenty-five year ^{cycles} old. The occurrence of cycles of "vital curve", apparently, exists in

other insects.

Entomologists in their ^{field} region of science irrefutably demonstrated that precisely the sun - ^{is the} that "general", who ^{leads} conducts into attack ~~to~~ fields locust hordes, ^{s and} that the flash/bursts of the multiplication of the locust and other insects ^{are these} ~~these~~ "biological protuberances" as ~~call/named~~ ^{called them} their N. S. Shcherbinovskiy, actually, they reflect in the terrestrial life of ~~the flash/burst~~ ^s of solar activity. The sun, apparently, ^{complex} affects ^{also} number more ~~complicatedly~~ organized living beings.

The epidemics, about which we spoke in the preceding/~~previous~~ chapters, now became history. As ^{for} concerns locust, ~~then~~ locust raids are not only the matter of the distant past.

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Dependence of the level of water in Amur and of catch of humpback salmon from the dynamics of solar activity (according to I. B. Birman).

- a) the highest water level in Amur of Khabarovsk during August;
- b) the catches of humpback salmon in percentages (to the catch of 1928).

Key:

1. Catch. o/o. 2. Years. 3. Water level, m.

This riddle ^{by} ~~will~~ scientist^s still one must ^{be} solve ^{the} understanding of the law governing the appearance of locust catastrophes, as can be seen from N. A. Shcherbinovskiy's works, apparently, will ^{by} ~~aided~~ ^{by} research on the periodically changing activity of the sun.

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Reaction F.

In our time physician does not visualize work without X-ray apparatus or clinical laboratory. Acquaintance with patient begins often from ~~his direction~~ ^{with} in analyses, ~~because~~ ^{since} any, even insignificant, deviations in the vital activity of organism first of all are reflected as in mirror, in ~~its~~ ^{his} blood.

An increase in the quantity of leukocytes - white blood corpuscle/bodies - immediately prompts thought about fester, about inflammatory process. An ~~incidence~~ ^{corpuscles} / drop in hemoglobin. a decrease in the number of erythrocytes (red blood ~~ball/spheres~~ ^{He}) - signals about the beginning ^{of} anemia. A change in the ~~settling~~ ^{sedimentation rate} velocity of erythrocytes, an increase ⁱⁿ (ESR [PO3 - erythrocyte sedimentation test], frequently proves to be the almost only identification mark, which forces ^{an experienced} ~~wiser by the experiment~~ of therapist to suspect the growth of ^a malignant ailment in ^{a seemingly} healthy ~~to form~~ person.

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Professor Maki Takata.

The blood of the different types of animals and man differs in terms of constancy, not only in the relation to the norms of the content of ^{regular} cell regular/prescribed cell/elements, but also in composition of simple and complex chemical substances. The level of sugar in the blood is ⁹ the direct index of the state of the pancreas, and an increase in the cholesterol is a sign/criterion of arteriosclerosis. Early diagnostics, timely beginning, and therefore, ^{also} and the success of treatment in many respects depend on the skill to ~~end~~ to exhaust the riches of the diagnostic palette of the blood, which ~~are~~ ^{great} concealed in it ~~extreme~~ diagnostic possibilities.

The Physicians, ~~the~~ hematologists say that the blood can describe the illness/sickness/diseases, the tastes, the habits, the age and the past of man more than patient himself, ^{if we} ~~only necessary to~~ know how to read analysis.

This art ^{has been} completely mastered ^{by a} the professor ^{at} of Tokyo university Maki Takata, whose name it is long known to the hematologists of entire world. ^{This scientist was made famous} ~~Glorified scientist~~ opened ^{by it} in 1935 the ingenious ^{discovered by him in 1935} diagnostic reaction of the blood, which was ⁱⁿ through several ^{standard} ~~summer~~/years customary in all world.

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Using simple chemical reagents, Takata ~~it~~ learned to find the quantitative indices of the process of the flocculation (subsidence) of the proteins of the blood - albumins, and with the aid of this reaction to determine the stage of the development of the ovarial cycle in woman. Albumins are present in the blood in the form of colloid. In test tube they fall out into flakes, "flocculate"; ~~and~~ therefore the newly ^{discovered} ~~open~~ reaction Takata ~~it~~ call^{ed} ~~named~~ reaction F. Since reaction ~~F~~ depends on the activity of ovaries, even in healthy woman it gives in different time^{at} different indices. In man these indices are much more constant.

The organic colloids of the blood ^{are} - formation ^{which} ~~education~~ are unstable. They are destroyed even from ^{slight} ~~weak~~ physical effects, and reaction ~~F~~ belongs therefore to the complex, sensitive tests, which require most severe satisfaction of stable experimental conditions. Before daring to recommend ^{such a precise} ~~this fine/thin~~ reaction for ~~the~~ mass medical practice, ^{Takata} ~~pedantic~~ and scrupulous in scientific work ~~that~~ Takata decided to preliminarily verify, ^{how is} ~~as will~~ influence^d the course of reaction ~~F~~ ^{has} different effects.

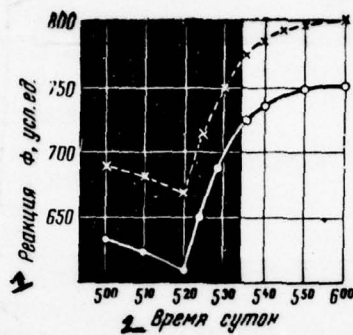
In 1936 the scientist ^{began} ~~of beginnings~~ to daily conduct research ^{of} the blood for the reaction ~~of~~ F. Donors in experiments ^{were volunteers} ~~agreed to be~~

^{among his}
~~the~~ nearest associates and ~~the~~ colleagues. Among them the doctor
Hatashita. No one could foresee then, that Hatashita in voluntary
donor's role it is necessary ^{would} to remain not ^a day ^{or} and not month, but
^{whole} nineteen ^{his} summer/years! "Without ~~its~~ selflessness, ~~it~~ ^{my} speaks now
^{gap} Maki Takata, I would not know how to bring ~~its~~ research to successful
result".

What did occur? Why ~~thus~~ did ^{he} ~~tighten~~ ^{of} ~~itself~~ checking one
^{take so long?}
diagnostic reaction of the blood? But happened unforeseen! During
January 1938 with the reaction of flocculation ^{was} ^a ~~were~~ connected the
strange incident: suddenly, without ^{any} the visible reasons it began to
~~grow~~/rise in the completely healthy men. Mass asymptomatic epidemic
in Japan? ^{there was and no} Reliable basis/~~bases~~ for such suspicions ~~were not~~, and
Takata ~~it~~ was lost in guesses.... But meanwhile the blood serum of
the men behaved in laboratory in the manner that earlier behaved ~~the~~
only serum of the female blood.

Changes in the blood never are causeless, already in this Maki
Takata ~~it~~ was confident. But if reason lies not in the organism
itself, then it means ^{that is} ~~it~~ outside it. Somewhere in the environment?

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Dependence of reaction F on rise and sunset, i.e., on the position of the Earth relative to the sun (per Takata).

Key:

1. Reaction F , conv. units. 2. Time of day.

And Takata began ~~the~~ searches for the mysterious reason, which suddenly destroyed the ^{smooth course} ~~quiet run~~ of reaction F. Beginning ^{on} from May 1938 ^{he} it in Tokyo, and its colleague Muratsugi in the city of Kobe several times during day, beginning with sunrise ^{from the} ~~placed~~ reaction F ^{test and} ~~they followed these~~, ^{how} as it changes during entire day.

It is easy to say "external reason". But ^{is it easy} ~~as it to find?~~ From what to begin searches? Finally ^{the} ~~to~~ organism can ^{be} ~~influence~~ ^{by} everything ~~anything~~: ^{heat} ~~fever~~, the cold, rain, the illumination, the elevated pressure of atmosphere and so forth, not to mention changes in the mood, agitations, etc. Any disturbance/~~breakdowns~~ in the course of experiment also can change the final readings.

It was necessary somehow to narrow ^{down the} ~~a~~ quantity of the possible reasons, to exclude immediately from suspicions everything, ^{possible} ~~that be~~ managed. ^{Maki} Takata developed ^{the} ~~the~~ plan/~~layout~~ for experimentation. The blood is taken daily ^{at} ~~in~~ the same hours. The donor and the laboratory assistant, which takes the blood, electrically are insulated from the Earth by glass or porcelain insulators (these conditions ~~it~~ had to be observe ^{by the} ~~and~~ experimenters themselves).

^{a control} For checking the blood ^{was taken} ~~took~~ on the Earth, underground and,

finally, above the Earth: in laboratory, in pressure chamber, in shaft/mine, on aircraft.

When after a lapse of the half a year Takata and Muratsugi compared ~~its~~ readings, to their mutual surprise, the curves of the course of reaction f in different cities simultaneously they turned out to be similar ! First, reaction f had well ~~expressed~~ ^{defined} daily variation. For 6-8 minutes to sunrise it suddenly increased approximately by 200/o !

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(We are speaking about the astronomically calculated ~~torque~~ moment of sunrise, and even if the eastern part of the horizon/~~level~~ is ~~enclosed~~ ^{covered}, for example, by mountains, due to which the sun shows only ~~in~~ ^{an} the hour after its rise above the ~~geometrical~~ ^{mathematical} horizon, then matter is not changed). During day the reaction f continued to ~~grow~~ rise, but soon after sunset it gradually decelerated. The daily variation of reaction f did not depend on that ^{whether man} was located ~~man~~ on street or within stone house, ^{whether there was a} ~~did pass~~ thunderstorm or ~~it stood~~ fog.

^{Ascent in}
Uplift on aircraft increased reaction f with an increase in the height, at which is taken the blood. Takata ^{decided} ~~solved~~, that here manifests itself not the action of the ~~lowered~~ reduced atmospheric

pressure, but the effect of the sun, since in pressure chamber decompression did not produce change in the reaction ℓ .

During solar eclipses both full/total/complete and partial, decreased the reaction ℓ . In this case the blood almost instantly reacted to eclipse, to changes in the intensity of flow of solar radiation.

The passage of the large groups of the sunspots ^{over} through the central meridian of the sun almost always was accompanied by ^{an} uplift ⁱⁿ of reaction ℓ .

Thus, again the culprit of the biological disturbance/~~breakdowns~~ ^{was} in the human organism this time ~~render~~/~~showed~~ the sun !

Changes ⁱⁿ of the reaction ℓ with ^{sun} rise and sunset, and also depending on geographic latitude indicated that the effect on blood flows directly from the sun.

Repeated experiments ever more fastened confidence ^{of MaKi} Takata in the fact that the blood reacts ^{to} on the sun uncommonly sensitively. "It feels" not only ~~flash~~/bursts, explosions, appearance on its surface of new spots, the passage of the spots through the central meridian, but immediately ^{response} ~~answers~~ in its own way even ^{to} on each appearance and

the disappearance of heavenly body.

Which part of the solar spectrum is bioactive? - ^{wondered} asked ~~itself~~ ^{the} scientist. The blood ~~is~~ "perceived" the presence of the sun even when its ~~world~~ light did not reach into laboratory. Penetrating ~~emission~~/radiations? - ^{these are blocked} In the conventional opinion, ~~then~~ blocks ^{by} atmosphere. Corpuscular radiation? - It is scattered and is lost to the atmosphere. Radiowaves?...

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In order not to guess to infinity, ^{what was behind this} ~~in what here matter,~~ professor Takata started ^a the new study of reaction ~~f~~. He began to check, ^{how} ~~as~~ affects its course ^{is affected by individually by} separately ~~world~~ light, the ultraviolet rays, ~~the~~ radio waves, and also soft and hard x-rays with wavelength ^{as} from 0.1 to 0.07 Angstrom, gamma-rays and neutrons.

This is how ^{he himself} it ~~itself~~ formulates conclusions from ^{his} its almost twenty-year old investigations in letter to the authors of this book: "We investigated the "reviving radiation" of the sun for 19 ~~summer~~/years every day. There are no doubts, that this radiation satisfies all requirements ~~in order~~ to be ~~that which was~~ described as ^{the discovered} newly ~~open~~ effect of solar radiation.

There are no doubts, that solar radiation contains ^Qthe new component, characterized by the powerful penetrating power and the powerful ionizing effect on human body, i.e., by ^{an}the expressed biological effect.

All living on the Earth people without exception/~~elimination~~ are subjected to the influence of this form of radiation, ^{the}by source of which ^{is}are the sun. This radiation cannot be revealed by purely physical methods. It ^{can be}is possible to measure ^donly with the aid of reaction in blood serum.

By the ~~way~~ of the irradiation of man by this form of radiation - the "fourth form of solar radiations" - occurs ^athe noticeable "vital ionization", which can be measured by reaction ~~F~~. Measurement of this vital ionization became possible with the aid of the irradiation of body by ^{hard}rigid x-ray/beams (X-rays), by gamma-rays, neutrons, even neutrinos ^ffrom atomic reactor. Therefore it was ^{decided}solved, that the nature of this mysterious emission/radiation must be similar to the neutrino emission/radiation, of the active sun ... ! ~~The~~ ^{Man} actually is ^aliving sundials". ^{As A Kind of}peculiar scientific commentary to conclusions of ^{Maki}Takata ^{was provided by}served the investigation of another hematologist - Soviet physician N. A. Shul'ts. Independent of Takata, Shul'ts arrived at very similar conclusions.

^{Among}
~~In the~~ physicians as has already been ^{said} spoken, it is customary to assume that the blood was constant ⁱⁿ by its cell composition. The norms of the content of cell ~~cell~~/elements ^{per} ~~in the~~ cubic millimeter of the blood for ~~a~~ convenience ^{is} ~~(even print~~ ^{of} out on the laboratory forms. ^{seen}
~~Deviation~~ from these norms is ^{an} ~~estimated~~ as the alarming symptom of the appearance of some disease.

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This is what wrote in journal "laboratory matter" N. A. Shul'ts in 1960: "Recently on the pages of journals increasingly more frequently is noted the discontinuity/interruption between the taken normal indices of the blood and observational data. Changes in the picture of the blood in essence concern the ~~case~~/cells of ^{the} ~~a~~ white series, absolute number and the percentage of their forms. Unfortunately, special research on this phenomenon ^{has been} ~~is~~ conducted ^{for} ~~altogether~~ only for the extent ^{of} ~~elongation~~ several dozen ^{years} ~~plus~~ ^{Per} ~~data~~, that relate ^{to} ~~toward~~ the end the XIX, centuries, ^{there is} ~~one~~ leukocyte ^{normally per} ~~came in norm on~~ 350-500 erythrocytes. Since ^{the} ~~a~~ quantity of latter in healthy man was 5000000, the norm of a quantity of leukocytes were considered 8 000 - 12 000. ^{Within} Through twenty ~~summer~~ ^{number} ~~years~~ this ^{the} ~~numeral~~ ^{was} ~~decreased~~ to 6000-10 000. Before the Second World War ~~norm were~~ considered 6 000-8000, and now we frequently encounter completely healthy persons ^{with} ~~from~~ 4 000 and even 2 000 leukocytes" 1.

[Laboratory Science]

FOOTNOTE : N. A. Shul'ts. Laboratornoye delo, No. 2, 1960. END

FOOTNOTE

What ^{is} the reason for such unexpected shift ~~shears~~? In order to explain it, N. A. Shul'ts, ^{who} ~~living~~ ^{as} and who works in Sochi, for the extent ~~elongation~~ of several ~~summer~~ ^{years} daily ~~it~~ ^{blood} took the analyses of the blood of the "basic" inhabitants of city. In the period of the maximum of solar activity in 1957 the content of the leukocytes of the blood in different people began to decrease. N. A. Schulz gathered and processed 300 thous. analyses of the blood of different persons, carried out in the laboratories, which were frequently being located at a distance ^{of} thousands of kilometers one from another.

After generalizing data of several countries (USSR, Italy, France, Belgium, England, etc.), N. A. Shul'ts reveal ^{of} ~~detected~~ that an increase in the number of chromospheric flares on the sun, and ^{the} appearance of violent protuberances almost everywhere lead to a characteristic change in the picture of the blood, to a decrease in the leukocytes with a simultaneous increase in the content of lymphocytes. In the period of solar ejections the state of the blood

is ^{reminiscent of} very distantly ~~reminiscent of~~ that, that is observed after radioactive or nuclear irradiation. The degree of these changes is dissimilar in the blood of people and animals in different geographic latitudes. With approach/~~approximation~~ to poles it is ^{sharpen} ~~brighter~~, i.e., the blood more powerfully reacts to an increase in the solar activity. In ^{the} ~~its~~ equatorial zones ^{it is not observed at all} ~~completely they do not note~~. This is completely explainable: ^{the} ~~than~~ nearer to ^{the} ~~poles~~, ^{the sharper} ~~facts sharper~~ and more distinct are exhibited the influences of cosmic and corpuscular radiation and magnetic perturbation³.

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It is known that in the region of poles ^{the} "terrestrial sheathing/skin" - the atmosphere - becomes especially ~~fine~~/thin and ^{is} ~~penetrated~~ ^{by} for cosmic radiation. Most sensitive to changes in the solar radiation turned out to be precisely leukocytes, the ^{most} ~~very~~ "jet/reactive" ~~edge~~/cells of the blood. Erythrocytes, ^{which} ~~as~~ ^e ~~ensuring~~ the constancy of the internal medium of organism and supply of ~~edge~~/cells, are less sensitive to perturbation on the sun.

Being ^Based on the observations of N. A. Shul'ts, hematologists they decided to reexamine the existing norms of the cell composition of the blood. However, N. A. Shul'ts was opposed to this reform. He asserted that this question is ^{as so} ~~so~~ complex ^{that it} ~~which solved it~~ must be in

solved in close
 intimate collaboration with the geophysicists. In order to reexamine norms, would be required several ~~summer~~/years. And finally, when it would be completed, leukocytosis again would ~~crawl~~^{creep} either upward or downward.

N. A. Shul'ts is convinced, that the blood of healthy people is subjected to the continuous changes, which depend not only on the internal state of organism and influence of environment. In the common/general/~~total~~ complex of the influences of environment ^{by} ~~a~~ change ⁱⁿ ~~of~~ the solar activity ^{is} indisputably capably of having a daily, hourly, even second-by-second effect on the processes, which take place in the blood and the hemopoietic organ^s/controls.

Weather No. 4.

On one of the populous beaches of Sochi almost ^{by} near the blue sea was arranged ^a white ^{outwardly unmarked} ~~imperceptible~~ by sight ~~of~~ house. Its only inhabitant is a magnetograph. The instrument, which records the fluctuations of the strength of terrestrial magnetism, arrived here recently from Pulkovo observatory. The Pulkovites acquired by the new, more advanced equipment, and the old magnetograph, which ^{was} ~~little~~ ^{during} ~~worked on~~ its ^{time} ~~to~~ century, ^{now} ~~lives~~ ^{out} ~~its~~ century in ^{its} ~~health resort~~ ^{administration} control.

The large part of the time it leisurely ^{prints} links on the ^{moving} driving paper tape ^{on} the even line, not causing anyone any special alarms. But from time to time instead of the straight line on tape appear zigzags, which gradually increase. These signals ~~about~~ the approach/~~approximation~~ of weather No. 4.

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And although from beach reach the merry exclamations ^{of vacationers} resting, sea glitters by solar ghost images and the surf almost noiselessly licks the edge of shore, the physicians already know; it ^a is ~~is moved~~ magnetic storm. All cores, ^{is moving in} hypertonics and neurotics must immediately ^{heart patients} pass to ^{go} a slower pace the ~~sparing mode/conditions~~: to obtain in advance medicines, not to be overloaded by water and solar procedures, in a word, to avoid completely probable within the next few days angiospasm.

Several years ago Sochi health resort ^{administration on} control ~~but to~~ the initiative of N. A. Schulz and N. V. Romenskiy's ^{main therapist} for the first time in our country ^{began a} beginning the mass preventive maintenance ^{for} of vascular crises, infarctions and other aggravations, connected with solar flares. The medical service of the sun in advance ~~prevent~~/warns all sanatoriums about the solar storms, conditionally ^{called} named weather No. 4. After obtaining ~~prevention/warning~~, the physicians ~~previously they~~ manage to be

prepared for solar attacks. *in advance.*

However, the medical service of the sun arose for the first time not in the Caucasus, but in France, in the efflorescent health resort city ^{of} ~~to~~ Nice, long before the Second World War. ^{It} Happened ~~this~~ thus.

The physicians have long already noticed one law, ^{which has} ~~for~~ long not ^{remained unexplained} obtained the explanation: the patients with acute diseases appear in office, as a rule, ^{for} during two-three days in a row. It was noticed also, that the assaults of severe pains, different kind of indispositions in the patients begin approximately simultaneously, regardless of the ~~fact, under which~~ ^{under which} conditions ^{they} live. When the physicians ^{began} ~~passed~~ taking into consideration ^{attacks} of the assaults of stenocardia, aggravations of the neuralgic pains and other symptoms, it was reveal ^{ed} ~~/detect/~~ ^{exposed}, that they are observed during two-three days and then suddenly cease for some period of time.

The same picture ^{was} ~~it~~ demonstrated to ~~the~~ physicians and ~~the~~ statistician ^{of} sudden deaths. ^{The} This periodicity of diseases, aggravations and mortality had long ^{before} ~~also been~~ has already been ^{discussed} ~~discussed~~ in the scientific medical corporations of the different countries. ^g The ^{attempts} to find the relationship ^{of illnesses} ~~/ratio~~ between ~~unhealthy series~~ and meteorological changes: ~~by~~ temperature, ~~by~~ the fluctuations of air humidity, ~~by~~ the velocity and direction of the

wind, by lightning discharges - they turned out to be unsuccessful.

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These phenomena rarely ^{coincided} were coordinated and in no way covered the enormous number of ^{coincidences} agreements, which ^{were} synchronously noted on ^{vast} the large spaces of the earth/ground, in the places distant from each other, where the weather was completely different. It was necessary to search for some other reason for strange "unhealthy series" ^{of illnesses}. The case in ^{in an} Nice aided to approach itself ^{to} the explanation of riddle.

Unexpectedly in operation of urban automatic telephone exchange they began to appear breakdowns. With careful technical inspection it was not impossible to ^{within a} reveal/detect any troubles. Through certain time the physicians focused attention on the fact that the interruptions in the work of telephone exchange systematically coincided with an increase in the cases of the aggravations of diseases in many patients.

ⁱⁿ The agreements of the disturbances in the work of electrical equipment and physiological disorders in people were so obvious that ^{there} arose the assumption about ^{that they were generated} generation by their one common/general/total reason.

The disturbance in the work of automatic devices ^{telephone} on exchanges and in radio communication very frequently they are the result of a sharp increase in the solar activity. If interruptions in the operation of communication ^{connection} ~~then~~ ^{do} impressively ~~do~~ coincide with the aggravations of diseases, it does ^{it} (not mean that the sun is guilty ^{for} in the sufferings of the patients?

To solve this question again ~~aided~~ ^{came to aid} statistics. Utilizing vast statistical materials, A. L. Chizhevskiy in a series of works ~~it~~ showed that ~~the~~ fluctuations of mortality follow more or less frequently curved spot-formation process on the sun. In the years of the maximums of solar activity on diagrams jump out ominous peaks; mortality ~~it~~ increases. ~~In~~ the years of the minimums - it decreases.¹

Alas, Koz'ma Prutkov erred when he said: "Death and the Sun cannot fixedly look at each other" !

FOOTNOTE ¹ A. L. Chizhevskiy also devoted his attention to the 27-day periodicity of a series of statistical data, associating them with the period of synodic rotation of the sun. Later, this dependence was confirmed. END FOOTNOTE

By the 1930's the French scientists M. Faure, G. Sardu and G.

Vallo gathered ~~the~~ vast material, confirming, that the passage of the spots ^{over} through the central meridian of the sun into 840/o of cases coincides with sudden deaths, infarctions, strokes and ~~the~~ aggravations of the symptoms of chronic diseases. It is necessary to ^{give} ~~return proper~~ to these scientists, ^{their due} ~~who~~ ^{since for} almost during twenty ^{these} ~~summer~~/years, from 1922 on 1942, in a most careful manner studied this question.

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They organized in France the "International institute ^{for} ~~on~~ research on solar, terrestrial and cosmic radiation" - the first in the world medical service of the sun, which sent ^{to} ~~in~~ many hospitals and clinics bulletins ^m ~~about~~ the state of solar surface.

The new direction of investigations found among the physicians numerous supporters. In dozens ^{of} hospitals and clinics the physicians daily recorded the course of illness/sickness/disease and aggravations in the patients, record/fixed the least deterioration: ^{in strength} excitation and insomnia, decline ~~of forces~~, pain in the heart, the joints, the liver, the nodules, ~~the~~ pressure of the blood ^{faintness} ~~swoon~~, shortness of breath, vertigoes, etc. Simultaneously in astronomical observatory on Mont Blanc and at meteorological station in ~~Nice~~ ^{were} conducted ~~the~~ daily notations of solar activity.

Information from the medical institutions ^{was received by} ~~entered~~ Doctor's ^{sent} ~~conduct~~ ^{giving} ~~odds~~, who guided the tables, communicating data on the frequency of the cases of infarctions and strokes after ^{for} ~~several~~ ~~summer~~/years to A. L. Chizhevskiy. Somewhat previously remarkable Soviet physician- statistician P. I. Kurkin, after generalizing data on infarctions and strokes after several ~~summer~~/years, collected in our country, also ^{gave them} ~~granted~~ to their A. L. Chizhevskiy. Graphic comparison of the materials of P. I. Kurkin and M. Faure again confirmed that the character of the curve of solar activity and course of vascular diseases are extremely similar. In such cases of statistics ~~they~~ ^{the} say: "the closeness of ~~communication~~ ^{great}/connection of ^{the} two empirical curves turned out to be very large".

Subsequently the brothers Duell examined 200 thous. cases of death from the diseases of brain and nervous system in a series of the cities of Europe. As heliogeophysical index they selected the world result of magnetic perturbation. (Geomagnetic activity follows the basic solar disturbances). With it they collated data on mortality. As a result of the calculations of the brothers Duell again was confirmed the fact, that in the days of the passage of the sunspots ^{over} through the central meridian of the sun the mortality reaches maximum. Are especially sensitive to

disturbance/perturbations on the sun the vascular patients, the ~~heart patient~~ ^{patients} ~~cores~~ ^{sick} suffering heavy infectious diseases and the weakened chronics. This is understandable. Healthy viable organism is "system in equilibrium state". The stability of sick organism is much lower.

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In certain cases of small ^{external} effect from without it is sufficient in order to play during illness/sickness/disease the role ^{of} "starting gear". This is why by the ^{of} earth/ground periodically ~~grow~~ rises the mortality.



Experiments with chemical tests in an underground grotto.

Of course, it is necessary to be specified^c. Mortality first of all depends on social reasons. War, poverty, hunger, anti-sanitation, exhausting work - here are the reasons for premature mortality. But illness/sickness/disease and death is ^{a)} phenomena not only of social, but also biological order. By investigating them, it is not possible to discount the biological reasons: influence on the human organism of environment and ^{such} powerful energy factor as solar radiation. There is no doubt that the medicine of the future will focus attention on modest, ^{but} ~~on the~~ convincing curve^s graphs, constructed by the specialists, who studied the "Sun-Earth" interconnection.

For the extent/~~elongation~~ of last/~~latter~~ 17 ~~summer~~/years Vladimir Pavlovich Desyatov, ^Docent of Tomsk medical institute, daily compared ~~the~~ cases of sudden death with the state of ionosphere, with changes in the solar activity. V. P. Desyatov showed that ~~the~~ mortality substantially increases into the first three days after chromospheric flare on the sun. ^{the} ("fateful day" V. P. Desyatov considers ^{to be} the second day after the appearance of a flash/burst.

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Infarcts, strokes and magnetic storms on the Earth appear not immediately at the onset of spots or flash/bursts on the sun. Magnetic storm ^{develops} ~~is developed~~ on the average of 26 hours later. The

intensity of storms varies within the limits of 27 days, i.e., is equal to the period of the rotation of the sun. Magnetic storm begins ^{at} ~~only in one determined place~~ ^{Certain} and ^{propagates within} ~~is spread during~~ 4-7 minutes ^{to} ~~on~~ the entire Earth.

The appearance of "un^{of illnesses}healthy series" and the origin of the "fateful days", about which speaks V. P. Desyatov, will become clearer, if we visualize ~~visually~~ the picture of the motion of corpuscular flux from sunspot. Let us compare the ^{moving} ~~driving~~ around its axis sun with the rotating lamp/~~canopy~~ ^{searchlight} of beacon or projector. In the same way as the narrow and pencil beam of ~~world~~/light accomplishes circular motion ^{through} ~~along~~ dark space, ^{there occurs} it ~~passes~~ in outer space ^a the comparatively narrow directed radiant flux, emitted ^{by} ~~as~~ sunspot or ^a the region of chromospheric flare. ^{within} ~~Into the~~ determined time intervals, when spot it passes ^{over} ~~through~~ the plane of the central meridian of the sun, its emission/radiation, falling perpendicular to the surface of the Earth, ~~they bombard~~ ^{it} with its corpuscles. The Earth again is immersed in the electric flux, which moves from the sun. This it lasts a day or two, not more ! Then spots or protuberances together with the sun are moved ^{on} ~~further~~ and, thus, flow is deflect^{ed} ~~diverted~~ to the side. The action of surplus radiation ^{on} ~~to~~ the earth ceases, and planet again obtains its usual portion of radiant energy. But ^{then} ~~thus~~ (the spots of ejection again fall into the plane of the central meridian of the sun, and the Earth ^{is again bombarded by} ~~they begin to fire~~ corpuscular

fluxes. By such irregularly is realized the influence of the active sun on planet. It is not surprising that its living world answers these effects by intermittent reactions.

Letter from Kiev.

Fates of scientific problems and the fate of people ^{are} different.
"Not it is important ^{what} that you search for, it is important ^{what} that you
find", wrote Pascal. ^{Some are fortunate} ~~One it conveys~~, for others it is necessary to
^{barriers whose origins are unknown} overcome unknown ~~whence the taken obstructions~~. Heliobiology ^{has not} ~~did not~~
^{been so fortunate} ~~transport~~.

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Its development ^{was hindered by} ~~stirred~~ the Second World War. It inhibited the rate
of investigations, it destroyed scientific contacts, it interrupted
communication/~~connections~~ between the scientists of the different
countries.

In the USSR after war little ^{few were} ~~who was~~ occupied by ~~the~~ searches
for the theoretical proofs of the influence of solar activity on

while with ^{research} biosphere, ~~but by the~~ experimental searches for such proofs and ^{absolutely} completely no one it was occupied. Solar interferences ^{have} sometimes ^{announced themselves to} themselves "declared about itself" by scientist. For example, in the experiment of the Doctor of the Medical Sciences Anatole Kuz'mich Podshibyakin the sun ^{became} was ~~mixed~~ unexpectedly involved.

Podshibyakin is an electrophysiologist. The ~~object~~/^{his} subject of its investigations is skin (according to him - ^q the forgotten by the physiologists organ/control). Skin will bear ^q in organism many physiological loads. It picks up signal out of external world, it regulates the temperature of body, shields organism from traumas and microorganisms. Through skin are discarded ~~the~~ waste substances, in it are formed the hormones, the skin protects organism from drying ~~out~~ finally ^{it} is the organ/control of electroregulation.

Changes in environment affect us through skin coverings. Skin is developed from the same ^{germinal layer} incipient leaflet, from which are formed the ' sense organs: smell, view, audition, interorgan nervous ^{and represents} communication/connections are an apparatus of "contact reception". During the damage of internal organ ^s controls without fail begins the damage of the skin coverings: each of them ^{has} had in skin ^a as their representation ^{ve as it were} (People-medicine ^{Folk} have already have long utilized ^{has} stimulation of ^{certain} the determined points ^s items of skin for therapeutic target/purposes). But the reflexes of internal organ ^s controls, which

cause, in the opinion of I. P. Pavlov, skin disturbances, unfortunately are not utilized, until now, in diagnostics. It is ~~more~~ ^{have not yet learned to capture} precise, ^{by} ~~the~~ physicians did not learn to still recover those signals, which the skin sends during illness/sickness/disease. If the physiologists master the methodology of determining skin changes, then the arsenal of diagnostic agents considerably will be enriched. I. P. Pavlov with regret state ^{here is also an} ~~established~~ that in this field of knowledge is an even enormous gap/spacing.

Attempting to decipher skin signals, A. K. Podshibyakin ~~it~~ began to investigate the static electric potentials of skin, in abbreviated form STEP. In 1950 ^{he} ~~it~~ published ^q ~~the~~ work, in which ^{by} ~~it~~ showed that in the places of the entrance of the nerves into skin, which it ^{ed} ~~call~~ ^{occur} ~~named~~ the "active points of skin", skin processes they ~~go~~ at completely different physiological level.

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In ^q ~~the~~ healthy person the interrelations between the active points are completely ^{determined} ~~specified~~. At the active points of the value ^s ~~of~~ STEP they have approximately identical value. But intense processes (normal or unhealthy) in organism change picture. One or several point ^s ~~items~~ they begin to differ in the value of STEP. The definition of changes varies depending on the ^{acuteness} ~~sharpness~~ of unhealthy process.

Scientist proved, that the STEP ^{can and should} ~~is possible and it is necessary to~~
^{be} ~~utilize~~ ^d for the setting of diagnosis. ^{with} ~~During~~ the damages of the
heart, for example, ~~of a change~~ ^{quite} in the STEP they are observed
~~completely~~ ^{at} distinctly in the second and fifth intercostal points, at
four points on the ^{corner} ~~angles~~ of blade. There is a definite dependence
between the skin and the liver, the brain, the spleen, the appendix,
the womb, etc. During hypertonic illness/sickness/disease, for
example, with the sclerosis of the ^{vessels} ~~containers~~ of the brain of STEP
noticeably it changes at the points, connected with the right
temporoparietal division of brain. A. K. Podshibyakin ~~it was~~
^{able} ~~possible~~ ^{he} using his own procedure, to establish ~~install~~ diagnosis
even before the appearance of explicit ~~sign~~ ^{Thus a} criteria of
illness/sickness/disease. So, in ^a ~~twelve month~~ child STEP they
signaled the beginning of pneumonia ^{before} ~~for four days to the~~ fluoroscopy
of ~~light~~ ^{lungs}. But scientist tortured ^{by a} ~~thought~~, which remained
incomprehensible, ~~Why~~ in different years average value of STEP varies
^{for} ~~at the~~ whole contingents of the people: ^{first becomes higher} ~~stops first above~~, then ^{lower} ~~below~~
^{than the} "norm". Solution ^{was} ~~arrived~~ ^{at} almost "randomly". On how this occurred, A.
K. Podshibyakin wrote in his letter to the authors of this book: "...
~~Into~~ 1954 experimental-design shops with my participation ^{for} ~~(the first~~
time, and in 1960 ^{for} ~~second time~~ they constructed for me instruments for
the measurement of static electric potentials. During checking it was
^{determined} ~~explained~~ that with the full/total/complete conformity of calibration
the instrument of 1960 ^{appears to give} ~~gives as if the~~ higher values of electric

potentials, than the instrument of model 1954. Without ^{having} producing the ^{compared the} comparison of instruments, I came forward ^{at meeting} during collection and, embittered ^{by} to the fact that the shops inaccurately fulfilled my order, asked special checking of each and every instrument.... ^{By} TO 1960 I finished the monograph ^{of} to eighteen ^I of printed sheets. ^{Submitted} It returned it. It was accepted for press under the condition of the correction of some small imperfections.

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Having before ^{myself} itself a material about the values of static electric potentials I it noted that their value during the years 1947-1949 were ^{higher} above in comparison with ~~I it noted that their values during the years 1947-1949 were above in comparison~~ with 1953-1954. During the years 1957-1958 ^{of} the value Σ of potentials ^{higher} they were above than into 1954. Affected by this revolution of events ^I I remove ^I took monograph from press. Into 1962, ^{and} even into 1963 all my thoughts were directed toward the explanation of the reasons for this incomprehensible phenomenon. In 1960 it was revealed also, that the positive effect on therapeutic stimulation ^{of cups} by banks, mustard plasters, novocaine block one should expect at the values of STEP ^{of above} more than 25 mV. My recommendations also turned out to be unsuccessful. The negative results during the years 1957-1960 were ^{even} observed ^{at} with values ^{of} in 30-50 mV.

It was necessary to again repeat the series of observations

where I conducted ^{them} their ten years ago. On the students of ^{health} sanitation camp it was possible to explain that STEP can rise, also, without weather changes. As early as in 1949 I noted that the appearance of the girls and women causes sharp shift ^{shears} in the value of STEP. I ^{decided} ~~solved~~, that this is connected with the electrification, which ^{is} ~~it~~ creates ^{d by} the female silk ^{underwear} linen, which leads to ~~focusing~~ inductions. It ^I ~~was right~~ ^{was right} ~~correctly~~. Elimination of the ~~women~~ ^{female} students, the nurses, ^{and female} the physicians - gave calmer background with measurements.... [What did he do with them? What price progress!]

^{My} ~~Its~~ observations I carried out in to the pine forest, where there is neither radio nor electrical interference. However, even, this did not bring the desired results. STEP continued to change with incomprehensible ~~form~~ and outside ^{of} any communication/connection with ^{anything known} ~~something~~ to me known. Especially in separate persons. ^{Arrived} ~~Cont~~ the autumn or the winter of 1963. ^{Exactly} ~~Accurately~~ I do not remember. In library completely randomly to me to eyes caught Yu. Vitinskiy's book: the "forecast/predictions of solar activity". Randomly I focused attention on series of ~~the~~ numbers, which there were registered as Woglf's numbers. It looked and estimated, that my potentials changed analogously. ^{I checked out} ~~were extracted~~ all the available in library monographs about the activity of the sun. Among them ^{was} ~~caught~~ professor A. L. Chizhevskiy's book. Gladdened, I began to compare values. The mathematicians from the institute of cybernetics

of the Academy of Sciences of UkrSSR aided me in this. They calculated the coefficient of correlation, which turned out to be equal to 0.86. It was necessary to apologize ^{to} ~~itself~~ before the engineers and to study completely new for me question.

Such high
So high a degree of correlation caused in me natural biological skepticism. What this does mean?

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Could it be that medical diagnostic methods developed over milenia
The really ~~manufactured by millenia medical diagnostic methods~~ are subject to review? *Does that* ~~What, which means,~~ *that* (any medical procedure must be given into conformity with the state of the sun? It does ^{turns out} ~~emerge~~, that those designation/^{instruction} purposes and the recommendations, which ^{are suitable} ~~do befit~~ in the years of quiet sun they can even ^{damage or} ~~injure~~, strengthen pathological reaction in the years of the maximum of solar activity?

My
~~Skepticism is my~~, however, became to very rapidly ^{dispelled} ~~be scattered~~ during the study of question. It proves to be that there is ~~communication/connection~~ not only between STEP ^{and} ~~by~~ Wolf's numbers, but also between sun and quantity of hydrochloric acid, ^{produced} ~~isolated~~ by the stomach of dog for six hours. ^{Also the} ~~A~~ quantity of mineral substances, ^{produced by} ~~concluded~~ bile, ^{indeed} ~~also proves to be~~, yes, ~~yes~~ - it depends on the state of the sun.

True, all these facts must be still verified, but in their authenticity I am convinced. ^{This is supported by} To ~~this~~ ^{by} other observations. Wolf's numbers, in particular, although they satisfied the astronomers, reflecting ^{the number} a quantity of spots on the sun, i. e., ^{the} ^{is} degree of his physical activity, do not reflect the density of energy flux both radiant and corpuscular. But indeed they in turn, exert a substantial influence on biosphere. Therefore I compared the acidity of the gastric juice of dog with the state of the magnetic field of the Earth, depending on the sun. ^{the} quantity of acid, which it ^{was} ~~produced by~~ ^{developed} the stomach of dog, changed depending on the degree of the perturbation of the magnetic field of the Earth.

And finally ^{these are the} ^{unreliable} completely ~~improbable~~ facts. It was possible to reveal/~~detect~~/~~expose~~, that the value of conditional food reflex in dogs depends on the values, which determine the state of the magnetic field of the Earth. From vertical and horizontal components and ^[slant] declination. In healthy dogs during ^{nonacute} ~~blurred~~ disturbance/perturbations and even magnetic storms with ^{gradual} ~~smooth~~ beginning the value of the conditioned reflex increases depending on ~~an~~ increase in the value of magnetic components. During powerful magnetic storms with sudden beginning, as a rule, the value of conditioned reflexes is reduced. This in healthy dogs. In sick animals under conditions of ^{an} ~~the~~

experimental disruption/~~separation~~ of higher nervous activity any increase in the indices of geomagnetic field brakes conditioned-reflex activity, i.e., the value of conditional food reflex.

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But very, perhaps, improbable turns out to be the fact, that of ^{an} old "most reasonable and circumspect" dogs during magnetic storms ^{was} improved the so-called differentiation. You remember that this ~~such?~~ I.e. ^{an old} ~~trying~~ dog during geomagnetic disturbances obtained ^{him} seemingly supplementary energy effect, which ~~it~~ makes it possible for ~~it~~ to make a correct selection.

Thus ~~and entire/all~~ ^{done} ~~history. Everything, history. Everything~~ ~~that made~~ by humanity in biology, medicine, chemistry, the rise in productivity of work, it is necessary to connect with the activity of the sun. And ~~these are~~ ^{this is} not ^a paradox, but ^a need. Without taking into account ~~of its~~ effect on the life of the Earth there cannot be the successful progress in science and engineering. These are my solid persuasions. ~~Hearth by them~~ ^{my name to them} I will sign ^{at any time of days}. Unfortunately, I ^{am not still not well acquainted} ~~is still small by sign~~ with this problem and, to me as physician and physiologist, ^{it is difficult to get my bearings} ~~to complicatedly be dismantled/selected~~ ⁱⁿ at problem No. 1 "~~scintse~~ ^{SUN-EARTH} ~~Zealya~~". But fact remains fact.

achieved
Everything, ~~mined~~ in science until recently, must be reexamined and connected with intensity in the work of the sun" !

Here, perhaps, it is worth mentioning that even in the 20's A. L. Chizhevskiy with the support of academicians P. P. Lazarev and A. V. Leontovich produced about three thousand measurements of the electric potentials of skin in man. He establish^{ed}/~~installed~~ the dependence of these potentials on Wolff's daily numbers.

In conclusion let us add, that recently many special journals reported ^{by}/~~discovery/opening~~ American scholarly R. Becker, who agrees with with the works of the Soviet researchers. R. Becker reveal^{ed}/~~detected~~ that on the body surface of ~~the~~ man, and also other vertebrates the electric potentials were distributed in a specific manner. The reason for their emergence he considers the activity of ^a/~~the~~ special electrical system, which, in his opinion, controls the velocity of propagation of biocurrents, and furthermore, it ^{transmits}/~~transfers~~ ~~the~~ information about pain. It is possible to assume that precisely this system reacts to solar effects. ^{Forming at the dawn}/~~After being formed at twilight~~ ~~colors~~ of evolution as control system in the highly organized organisms, ~~it~~ it plays, obviously, only auxiliary role, but in the life of primitive animals to it still belongs role of one of the primary control circuits. In the process of evolution, gradually becoming ^{more}/~~complicated~~, living organisms went away from direct

dependence on the sun.

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(It suffices to recall that the pigment of the blood - ^{is} the brother of chlorophyll; ^{although} however, we do not ^{become} green ^{or} ^{with} ~~and do not~~ redden ~~during~~ the appearance of a ^{sun's} solar ray ^{beam}). In the highly organized animals the dependence on the sun became less intimate, ^{although, it} however, in no way disappeared. In later ^{adaptation} ~~adaptable~~ stratification^s, the physiologist can ^{find a} ~~group~~ basis - the old evolutionary mechanisms whose existence does not cause doubts.

From molecules to stars.

In Italy, in the ancient city of Florence, where there ^{once} ~~is no~~ time bloomed the genius of Galileo Galileo, lives and works professor Georgio Piccardi. In the summer of 1964 professor Piccardi stayed in Leningrad and at conference in Pulkovo observatory ^{reported on} ~~announced~~ about his works.

^{was} How ~~did~~ ^{interested in} interest the Italian chemist ~~of~~ the astronomers and astrophysicists? Guest described the simple water - H_2O , to research

on which he dedicated more than thirty ~~summer~~/years of work, and about how with the aid of this ordinary substance were ^{discovered} ~~opened~~ the surprising ^{going} ~~facts~~, far ~~emerging~~ beyond the framework of chemistry....

Brussels, Tuebingen, Vienna, Trieste, Florence, Kumamoto, Antarctica, Madagascar, whole world during recently the past international geophysical year, literally was converted into one chemical laboratory. The scientists of all specialties on the initiative of professor Piccardi on different meridians and parallels were ^{posed} placed daily ^{at} in the same hours, ~~the~~ identical chemical experiments: they followed the precipitation reaction, taking place in the inorganic colloidal solution of oxychloride of bismuth in water. With maniacal persistence the people every day of hundred¹ ^{of} thousand ^{times} repeated at the isolated points of planet ~~one~~ and the same ^{very simple} ~~simplest~~ experiment.

In order to clarify which important problems tried to solve science with the aid of these experiments, let us describe simple experiment. In two glass test tubes ^{is} simultaneously ^{with} ~~is~~ mixed ~~to~~ water an identical quantity of substance. It slowly deposits on the bottom.

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Precipitation is ^sformed faster either in right or in the left test

tube, although reaction conditions are identical - this ^{is change} ~~change~~, is not more ! Now one of the test tubes they cover by ~~fine~~/thin metal ^{shield} ~~screen~~. Picture is changed. Approximately in seventy cases of one hundred reaction rate of precipitation increases in enclosed test tube. This irrefutable proof of the fact that ~~the~~ chance ^{has} yielded ^{to} ~~place~~ of regularity....

Which conclusions can be drawn from this experiment? First of all, that on rate of deposition act some external effects, from effects of which, apparently, shields metallic ^{shield} ~~screen~~.

^{What are the} ~~Which these are~~ reasons? ^{for it?} World, light, temperature, pressure, humidity remain constant/~~invariable~~. It is necessary to assume that the reaction rate does depend on some other, supplementary ambient conditions, for example, on magnetic field strength? Indeed it is known that the metal ^{shields} ~~screens~~ electromagnetic waves. The state of the magnetic field of the Earth in turn, depends on space conditions, in particular on the activity of the sun. By comparing data of chemical experiments ^{with} ~~on~~ the observations of the astrophysicists and astronomers during the prolonged period of time, it is possible, ~~that~~ means to obtain ^{any} (answer/response, ^{to the question of: how} as is perceived on the Earth the ^{all-} ~~highly~~ penetrating respiration of Kosmos. But ~~in order~~ to approach ^{it took} ~~itself~~ these "simple" conclusions, ~~Professor Piccardi they were~~ required decades. .

has existed and even before

Since ~~there is a~~ chemistry, also, ~~prior to this day~~, it was considered that one and the same chemical experiment^S under identical conditions, at any time gives identical result - constant.

Insignificant deviations from constants the chemists, as a rule, ~~were~~ *ascribed to* related ~~because of~~ errors in experiment itself. But Piccardi once ~~it~~ doubted the reason for "annoying inaccuracies". ^{He} ~~It~~ doubted the fact that one and the same reaction ~~was due~~, ^{must} other conditions being equal, to give identical result, if it is carried out ^{at} in different time. However, for similar doubts ^{such} ~~in it were~~ ^{he had} accumulated ^{a)} sufficiently many basis/bases.

Violently developing in the last/latter decades physics and astrophysics forever put an end to the representations of Kosmos as of speechless void, they showed that ~~the~~ outer space is literally saturated by material in all its infinitely diverse manifestations. But between the Earth and Kosmos there is no barrier/~~obstacle~~ ! In order to appear in Kosmos not only ^{is it unnecessary} ~~there is no need~~ to become astronaut, ^{*you don't have*} ~~but even to emerge~~ ^{*from your*} ~~his~~ own house.

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Universe everywhere ! But for an experimenter this means that in the

strictest experiment we monitor the only^{a)} part of the physical experimental conditions: temperature, illumination, pressure. The remaining effects, which ^{come} go from without, are not controlled ^{by} to experimenter. From them ^{nothing can} it cannot be been insulated, but at the same time of ~~them~~ ^{they cannot} it is not possible to adjust ^{be} ^{el} by the rotation of disconnection switch or by rheostat slider. ^{that just} That means as everything, that occurs on the Earth, simple chemical reactions undergo the effect of space forces and depend on ~~the~~ events, which occur in space, on the sun....

^{wondered} Piccardi repeatedly did ~~ask himself~~ why ~~the~~ chemists, knowing that one and the same reactions under "one and the same conditions" often does differ from constant, ^{why blame} ~~blamed in this~~ only ^{chance} ~~the case?~~ Who ^{has} ~~did~~ demonstrate, ^{at} that the identical result must be obtained in different time? Indeed time - one of the experimental conditions - ^a ~~value~~ ^{value} is variable. ^{what} But that, if we from these positions examine, not as knowingly erroneous, but as corresponding to the real state of affairs, deviation in readings ^{of} one and the same of the reaction, made in different time? The line of reasoning as if ^{seems to turn upside down.} ~~was translated from~~ head to feet. Piccardi literally ~~it~~ suffered from ^{the} thought, that the generations of the researchers discarded the results of the most valuable experimental work - the gold ^{at} fund of science - only because the obtained numbers did not ^{coincide} ~~converge~~ with constants. Not ^{mentioned} one of them ~~recalled about~~ time. It never occurred to the chemists simply to

place above the columns of formulas and numerals the date: year, month, number, hour, minute. But instants differ from each other just as person, trees, ~~pattern~~^{fingerprints} by ~~finger/pins~~^{this is}. Because the properties of "space - time" continuously change. Piccardi mourned the forever buried in the graves of the refuse baskets of calculation^s, notations, ~~the~~^{and} formulas, which thus would prove useful precisely now.

Everything it was necessary to begin anew... It was necessary to find the chemical reaction, which would ~~answer~~^{reflect} for the least fluctuations ⁱⁿ of environment, to create its kind "weathercock for determining space weather". Piccardi thoroughly sorted out all possible chemical elements, substances, solutions, discovering among them those, that could answer the expressed goal. Selection fell ^{on} to ~~quite~~^{the ordinary} usual, from our point of view, and the ~~the~~ unusual, from the viewpoint of chemist, substance - water.

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Piccardi knew well from long engineering practice the surprising properties of this substance, which ~~long time~~^{for a} ~~did not obtain~~^{was not} explanation.^{explained.}

He, for example, knew that the aqueous solutions, pre-processed by magnetic field - "activated" by it, behave differently from

solutions of ordinary water: precipitation reactions in activated water ^{occur} much faster ! This unstable effect Piccardi decided to utilize. Scientist prepared from the processed water the colloidal solutions, which turned out to be extremely sensitive and immediately answered for the least fluctuations ⁱⁿ of the physical conditions. This effect subsequently was substantiated in the "pseudocrystalline" theory of the water, created by the English physicists Bernal and Fowler.

A/ Chemical test, according to the project of scientist, had to be not only sensitive, but also cheap, simple in preparation - not to require expensive equipment, scarce reagents. In order that reactions would ^{occur} ~~pass~~ simultaneously in dozens of test tubes, Piccardi devised special mechanical mixer.

After all these preparations in 1951 the scientist undertook ^{an} the experiment, which ^{has already lasted two} ~~lasts the already second~~ decade.... Daily in Florence ^{at} "in the assigned hour" is ^{posed} placed one and the same chemical precipitation reaction. And thus ^{for} already decades it gives different results. As has already ^{mentioned} ~~been spoken~~ above, in the work, initiated by Piccardi, were include ^{of} connected the chemists ^{from all over} ~~of entire~~ world. Chemical tests ^{have been} "earned" in all parts of the Earth. And in all points of terrestrial globe they gave ^{mutually} similar ~~between themselves~~ readings.

The curve/graphs, which reflect rate of deposition, resembled to each other ^{like} ~~as~~ brothers. ^A Simple reaction, ^{like} ~~as~~ space weathercock, error-free reacted to solar weather, it recorded the ~~raged~~ ^{raging in space} in near-earth ~~space~~ magnetic storms, ^{sensitive} it responded to solar flares. Then ^{an} impartial judge (electronic computer) estimates curve/graphs.

The calculations showed that the intricate peaks and the waves of curve/graphs coincide not only ^{with one another} ~~between themselves~~, but also with the curve of solar activity during the same period. Solar radiation, penetrating through the walls of laboratories, first amplifies, then it attenuate/weakens the motion of molecules in the perpetual rotation of substance, subordinating the rhythm of its motion to the rhythm of stars.

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Strange manipulations and the even more unusual reasonings of the Italian scientist have long already interested heliobiologists. Water, which composed the basis of the chemical tests of Piccardi, ^{is} the blood of planet, the juice of life. Life, ^{we} ~~as they say~~ assume. was born there ^{once} ~~is no time~~ in ancient ocean, and prior to this ^{this} day all vital processes ^{occurred} ~~proceeded~~ in the aqueous solution: 70o/o body of man comprises water. Life is saturated with water and therefore

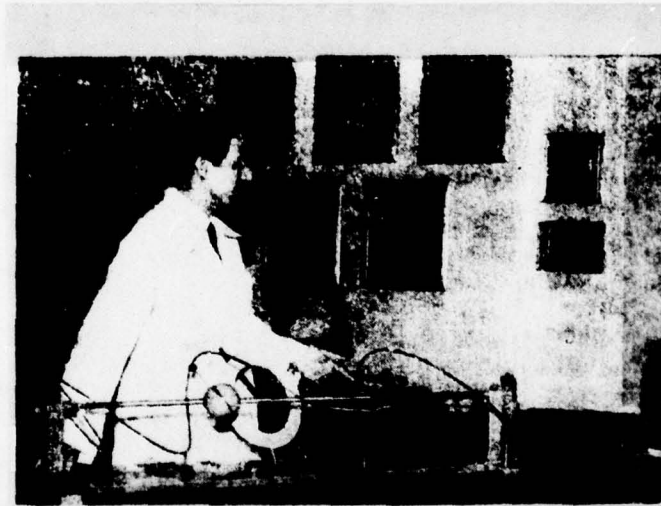
frequently it they call by the mirror of natural science. The expansion/disclosure of some ^{still} also unknown secrets of water always indicates simultaneously ~~and the expansion/disclosure~~ of the new laws of biology !

Understanding well that water ^{is} the main cell/element of life, Piccardi very attentively followed the searching^s of heliobiologists. ^{He} It had long ago been ~~has already been copied~~ ^{corresponding} with A. L. Chizhevskiy, ^{and familiar his} it was sign with its works, repeatedly it met^{with} professor Maki Takata, discussed solar problems with N. S. Shcherbinovskiy, ^{and} regularly it ^{corresponded} copied with N. A. Shul'ts, ^{and} knew well M. S. Eygensen.

"Long before me, ^{said in a} spoke he on report in Pulkovo, ^{Scientists to} ^{your Russian} ~~to the~~ ^{came to} (conclusions about the effect of the sun on biological processes, very close to my conclusions about the effect of the sun on the course of chemical and biochemical reactions, ~~arrived your Russian scientists.~~ ^{share} I completely divide the persuasion of heliobiologists ^{that} in the fact that the biological indices of solar activity are only particular manifestations of more ~~common/general/total~~ for an entire planet physical dependence on the sun. Solar phenomena, of course, act not on some colloid, not on some disease, not on ^{an including} separate man.... They affect everything that ~~which~~ occur^s ^M the planet, and tests are chemical symptoms of the occurring changes".

The sensitive colloids ^{of} ~~at~~ Piccardi ~~are~~ recorded ~~ed~~ not only the appearance of ~~flash~~/bursts and spots on the sun. These rough "shocks" are reflected in them immediately. They ^{register even} ~~recover~~ and the much less rough effects, not connected with solar activity. Specifically, they reflect some incomprehensible cyclic annual fluctuations with sharp incidence/drop during March. ^{Where do they come from? Perhaps like} ~~Whence they? It can be,~~ tests as counter in motor vehicle "~~does~~ count off" the rate of our spacecraft in galaxy? Specifically, this thought was born in professor Piccardi. ^{He} ~~It~~ call^{ed} ~~named~~ it "galactic hypothesis". It consists in the following.

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Professor G. Piccardi with his model of the heliocoidal motion of the Earth in galaxy. Sphere in center - the sun, small sphere is the Earth.

The Earth moves around the sun at the average speed 30 km/s. Together with it ~~it will be born to~~ ^{it moves toward} Hercules's constellation ^{at} with a velocity of 20 km/s. The combination of these motions determines the flight trajectory of our planet, which can be calculated. ~~The~~ ^{The} partially ^{is partially} relative rate of the motion of the Earth ~~first store~~ ^{added to} adds up ~~with~~ the speed of the motion of the sun, then it is deducted from it. Consequently, during one year the speed of the displacement/movement of the Earth in the direction of Hercules's constellation first decreases, then it increases. From 24 km/s during September it ~~transfer~~ ^{changes} converts to 45 km/s during March.

If in Milky way there are physical fields, characterized by lines of force, then the Earth, ~~being moved~~ ^{moving}, intersects them at the different rate^s and at different angles during September and during March. As a result the coupling effect ^{of the interaction} with these fields changes. To ~~control~~ ^{observe} that which occurs is possible at any point of terrestrial globe. For testing "galactic hypothesis" was required by Piccardi ^a the laboratory ^{by} size/dimension ^{of a} with whole planet.

This hypothesis at first glance is so ^{fantastic} such fabulous, that the author ~~even was not~~ ^{not even} decided ^{share} to be subdivided with it with the ^{his} ~~associate~~ ^{associates} chemists. He entrusted to its people with the

hardened/tempered imagination, ^{and} it described it ⁱⁿ ~~an~~ report in Pulkovo.

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The Soviet astrophysicists listened it with large interest because the contemporary theory of space and time does not deny (although directly and it does not assert) the expressed thought.

300 thous. experiments, set up on the initiative of Piccardi during fifteen ~~summer~~^{our}/years ~~on~~ entire terrestrial globe, confirmed the ^{hypothesis} ~~assumption~~ that the course of sensitive reactions strictly follows ^q ~~the~~ solar rhythm. Furthermore, it depends on the rate of the motion of the Earth in outer space. So, for the first time in the history of science on the basis of elementary chemical ^{experience} ~~experiment~~ ^{it was} ~~appeared~~ possibility to judge ~~the~~ events, taking place in the universe !

Sun and life.

Thus, to heliobiology is known many facts, which convincingly testify to the existence of connections between ~~the~~ fluctuations ⁱⁿ of solar activity and the numerous manifestations of the vital activity of terrestrial organisms. ^{What are} Are such the mechanisms of these ^{What} communication/connections? ^{Thus} As, with the aid of ^{the sun} which physical agents does ~~affect the sun~~ the living world of the Earth?

It would seem, it is clear that life moves ^{with} the solar energy: fluctuates energy flow, which goes from the sun, fluctuates life, ^{also} so, ^{thus} inflow to the Earth of solar energy is changed in connection with changes in the position of planet relative to the sun. As a result ^{there} the ^{known to} occur by well (all known seasonal metamorphoses in living nature. It is natural that the biosphere (totality of the living transformers of solar energy) sensitive ^{ly} reacts to changes in the "input power".

However, in the questions of ^{the} communication/connection of the manifestations of life with changes in the solar activity of this ^{such a direct} ~~straight line~~ and clear energy approach is impossible. ^{the} Whole ~~the~~ fact is that the total intensity of solar radiations is virtually constant ! The intensity of emission/radiation in the short-wave and long-wave parts of the spectrum, and also the intensity of corpuscular fluxes in the years of activity, as ^{states} ~~we already spoke~~, it can grow/rise ^{by} into thousand and even millions ^{of time} ~~once~~ in comparison with ~~of for~~ years ^{of} quiet sun. But the ^{total} ~~general~~ fraction of these emission/radiations in the energy balance of our star is negligibly small - on the average one hundredth of a percent.

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And ^{the greater part of them is} ~~yes moreover their large part~~, ^{admitted} ~~is not passed by~~ the atmosphere. Specifically, this fact serves as the basic source of skepticism.

In fact, at first glance it seems improbable ~~in order~~ that such ^a negligible from energy point of view external disturbance/perturbations could cause any noticeable deviations ⁱⁿ during biological processes. In connection with this one should recall statement of one of the outstanding biochemists of our time, Nobel prize winner Albert Saint-Georgy. "Biology, speaks he, this the

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science of ^{the} improbable, and I think that in principle for an organism are essential only statistically improbable reaction.... Reactions are monitored by the facts that they are statistically ^{unusually} improbable and can occur only because of the specific mechanisms, capable of ensuring their ^{regulatory} control. Thus, in living organism become possible the reactions, which ^{to} ~~seen~~ ^{seen} physicist impossible, or in any case, improbable" 1.

FOOTNOTE 1 A. Saint-Georgy. An introduction to submolecular biology. Moscow, "Nauka," 1964. END FOOTNOTE

The very phenomenon of life from the positions of thermodynamics ^{is an} ~~event~~ ^{event} "improbable", that contradicts the universal tendency of the universe toward its most probable state, to which would correspond the maximum entropy.

Biology deals with systems ^{for} where more complex than those, which use the physicists for checking their theories. The organisms, which achieved in their evolution of highest organization and finest internal regulation, are immeasurably more complex than the most complex of ^{these} ~~the~~ (created by man) automatic systems. But it is strange: while in technology became already completely customary to see, ^{how} ~~as~~

a control signal of negligible strength activates
~~negligible due to its power/thickness control signal gives into~~
action giant energy flows, in biology this possibility ^{is still considered}
~~by many to be~~ ~~many continues~~
~~to consider improbable !~~

But meanwhile it is possible that precisely the secrets of regulation ensured living peace of the Earth with sensitivity to finest variations in the hues of the respiration of the sun. "The mechanism of the conversions of solar energy," wrote the creator of the study of biosphere V. I. Vernadskiy, "was hidden for us in the infinite diversity of color ^{paints}, forms, motions of the nature: we ^{ourselves} ~~themselves~~ compose part of it ^{with} ~~by~~ our life."

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Centuries passed before human thought could note the feature of the single connected mechanism in the apparent chaotic picture of nature"

1.

FOOTNOTE : V. I. Vernadskiy. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

Heliobiology - ~~one~~ of the youngest branches of the science,

which is occupied by research on life, ^{is} still not in state to reliably answer the question concerning the nature of the mechanism of sun-earth communication/connections. Nevertheless ^{much has already} ~~is made already~~ ^{been accomplished.} ~~little.~~

By the works of the astronomers Herschel, Flammarion, the botanists A. E. Douglas and F. R Shvedova, chemist Arrhenius, biophysicist A. L. Chizhevskiy, entomologists N. M. Kulagin and N. S. Shcherbinovskiy¹⁴, hematologist Maki Takata, physicians P. M. Nagorskiy, M. Faure, G. Sardu and G. Vallo, S. T. Vel'khover, chemist Georgio Piccardi, heliophysicists M. S. Eygenson, A. I. Ol', M. B. Rubashev and many, many other researchers ^{if has been} ~~is~~ proved the existence of the ~~caused by the sun~~ ^{caused by the Sun} periodic perturbation in the living nature of planet. These basic investigations in recent years obtained confirmation in the works of the psychiatrist V. P. Desyatov (Tomsk), professor of veterinary science K. A. Dorofeyev (Kazan'), zoologist P. A. Panteleyev (Moscow), physiologist Michel Goclen (Paris), entomologist V. B. Chernishev (Moscow), chemist K. Kappel-Butte (Brussels), hematologist A. T. Platonova (Irkutsk), professor A. A. Maximov (Novosibirsk), microbiologist A. T. Sytin (Novosibirsk), physician-hematologist N. A. Shul'ts (Sochi) and other researchers.

^{an}
~~6~~ We were restricted to the incomplete enumeration of the works only ~~of~~ some heliobiologists. At present numerous works on radiation

biology and medicine, magnetobiology experimentally prove the ability of living organisms one way or another to ^{respond to} ~~answer to~~ emission/radiations and ^{they} ~~effects~~ of stationary and of alternating magnetic fields in the different combinations. These interesting investigations directly adjoin heliobiology, because, as has already been spoken, solar storms constant/invariably ^{are} accompanied by electrical and magnetic disturbances in all spheres of the Earth.

Erroneous it would be to think that in biosphere to the bursts of solar activity reacts ^{one certain} ~~some separate~~ organisms, ^{or certain types} ~~determined the form~~ of animals, bacteria or plants.

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On them answers entire living world of planet, the totality of all organisms, which V. I. Vernadskiy so laconically and accurately ~~call~~/named the "living substance of the Earth". "Chemical energy of biosphere in its ^{effecting} ~~efficient~~ form is ^{represents} ~~revealed~~ ^{of} ~~detected from~~ radiant solar heat ~~by the~~ totality of the living organisms of the Earth - ~~by~~ its living substance. ^{But} ~~Creating by~~ ^{through} photosynthesis - solar ray ~~beam~~ - in ^{the} ~~the~~ biosphere ^{on} ~~the~~ infinite number of new chemical compounds, many millions of the different combinations of atoms, they ~~it is~~ continuously ^{and at a speed} ~~with to mind by~~ incomprehensible ~~speed~~ they cover/coat the Earth with great ^{mantle} ~~thickness~~ of the molecular systems, which

extremely easily ^{yield} ~~give~~ the new compounds, rich in free energy in the thermodynamic field of biosphere, ^{which are} ~~unstable~~ and which steadily convert in it ~~to~~ the new forms of stable equilibrium.

...No matter what the phenomena of life consisted of, the energy, ^{liberated} ~~isolated~~ by organisms, is of their ^{primarily} ~~main~~ part, and ^{may be} ~~there can~~ be, ^{totally} ~~and wholly~~ radiant solar heat" ¹.

FOOTNOTE ¹ V. I. Vernadskiy. The biosphere as a region for the transformation of cosmic energy. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

The fact that as a result of weak disturbance/perturbations ^{there} ~~occur~~ ^{quite} ~~the completely~~ perceptible in their energy characteristics changes in some biological processes, does not give grounds to suspect heliobiologists ^{of an} ~~in~~ attempt ^{of an encroachment} to the law of conservation of energy. ^{Just like any} ~~As any~~ transformer, living organism cannot ^{yield} ~~give up~~ "at ^{out} ~~outdrop~~" more energy ^{than} ~~how~~ it obtains "at ^{input} ~~entrance~~". With the aid of the control system it is possible to affect the efficiency of the transformer, the qualitative and quantitative characteristics ^{of the} ~~(transformed~~ by it energy flux and even to increase instantaneous power, if, of course, ^{there are appropriate} ~~is a corresponding~~ "storage

battery/accumulator". It is possible finally to entirely "turn off" (i.e. to kill) organism in the same way as disconnects powerful power station tiny relay on the panel for its control.

Unfortunately, we almost nothing know neither about the device of regulator nor about the nature of control signal nor about his code. The numerous attempts to explain the observed synchronism of some biological processes with solar activity are extremely contradictory and not always will agree with all known facts. The majority of the voiced assumptions can be reduced to three in ^{basically} principle different hypotheses. The first of them, ^{defined} ~~shielded in~~ ^{essence} ~~by~~ ^{primarily} the botanists and the zoologists, ^{lies} ~~consists in~~ the fact that the effects of the activity of the sun on life ... does not exist.

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(At least, direct effect). I.e. facts are not disputed. On the contrary, precisely the representatives of these specialties ^{offer} supply in essence the empirical confirmation of synchronism, but interpret these facts as result only of the mediated effect of the sun. ^{by} ~~direct/straight~~ effect solar activity can ^{influence} ~~have only~~ to some meteorological and geophysical conditions, but already those in turn, ^[can influence] - to different biological processes and phenomena.

The second hypothesis, which ^{has won} ~~conquered to itself~~ numerous supporters, mainly from the ^{among} ~~number of~~ biophysicists and biochemists, assumes that ^{responsible} ~~critical~~ for sun-earth biological phenomena ~~appear as~~ ^{are} ~~time~~ those forms of electromagnetic and corpuscular radiation, which so sharply are amplified at the ~~torque~~ ^{moments} of an increase in the activity of the sun. Is implied direct effect of radiation on vital organs ~~controls~~ and the systems of organisms.

Finally, the third hypothesis, which ^{was} ~~advanced~~ ^{by} A. L. Chizhevskiy and which actively ^{defended} ~~it shields~~ at present ^{by} Maki Takata, proceeds from assumption about the fact that along with known electromagnetic and corpuscular radiation the sun in the period of its intensive activity emits even some unregistered by the physical instruments ~~the~~ emission/radiation, which possesses the specific property of biological activity ("emission/radiation z" per Chizhevskiy, or the "fourth solar radiation" per Takata).

It is interesting to note the peculiar interrelations of these points of view. The supporters of the first completely deny ^{all} ~~everything~~ others, the supporters of the second recognize the first and reject the right to the existence of the third, the supporters of the latter consider that not one of the hypotheses can be neither

unconditional ~~is rejected~~ ^{or} ~~not~~ ^{as a} considered that ~~which~~ rule.

We did not have the capability in ^{this} short pamphlet to subject to comprehensive analysis entire mass of the known facts of sun-earth biological communication/connections, ^{and} ~~yes~~ ^{is} this ^{anyway} and impossible. However, it ^{plans} ~~thinks~~ that ^{and even} those ^{have} few examples, which were mentioned in the preceding/previous chapters, ~~are~~ ^{to} made it possible the reader very to arrive at the conclusion about the fact that each of the named points of view deserves attention. In any case: "Whether ~~are~~ ^{or not the} ~~valid~~ ^{are valid} hypotheses or not, ^{have} noted ~~noted~~ Canadian physiologist Selye, they always determined the direction of scientific searches".

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But final ^{verdict} ~~sentence~~ in natural science ^{is, as} ~~will~~ carry usually, "its majesty ^{he} ~~experiment~~". By estimating the contemporary state of heliobiology as a whole, it is possible to briefly describe it thus: the ^{time} ~~pace~~ of the accumulation of empirical facts and formation of working hypotheses ^{is over} ~~concludes~~. Heliobiology it enters into the stage of the expanded/scanned experimental and theoretical studies with the application/use of contemporary methods. This means that heliobiology as science ^{has} ~~finally~~ ^{won} ~~conquered~~ ^a ~~to~~ itself place ⁱⁿ "under the sun" and confidently entered into contemporary natural science.

Pierced by the sun*.

FOOTNOTE * This chapter was written by Yu. G. Shishina. END FOOTNOTE

The book "In the rhythm of the sun" was ^{begin} initiated even ^{during} with the life of its basic author Aleksandr Leonidovich Chizhevskiy. To finish it it ^{he} did not have time. ^{His} ^{was} ^{by} work ~~it~~ interrupted ^{by} death.

A. L. Chizhevskiy began to study the effect of cycles of solar activity on biosphere in 1915, i.e., more half century back/ago, when man only learned to fly on the first clumsy airplanes, and flight into Kosmos seemed ^{an} by unrealizable fantasy. "In astronomy I began to be ardently interested as early as in 1906, thus wrote A. L. Chizhevskiy in its recollections, i. e., nine years old. The stars and the sun always were represented to me ^{as} by supernatural bodies, burning interest in which ^{has} it ~~did~~ not weaken ^{of} in me ^{even} and now. With ^{what} which sincere trembling I admired ^{my} by the stars through its telescope and took pleasure in the marvellous ability of mind to ~~get to~~ know. Nightly observations with telescope of stars opened to me whole unspeakable splendour of above-ground world. ^{How often I} ~~As frequently to me~~

dreamed ^{d/} the same stars with their living game, small and large
diamonds of gold, ruby, ^{the} blue color ^{of the purest} ~~cleanest~~ water.... ^{yet} But however
shallow were my ^{dreams} sleeps, ^{the} star reality ^{of stars} was still excellent. ^{Never} And ~~not~~ to
^{once in my} time for entire its life (I later was the assistant of astronomical
observatory), ^{could I, after} ^{my} thousand of times applying its eye to telescope, I
^{calmly} could not quietly look at celestial bodies. Even
professional/occupational habit did not free me from awe before
beauty and sublimity of sky. ^{How} ^{it attracts} As passionately will draw and
simultaneously frightens the ^{human soul the celestial sphere} ~~celestial sphere human soul~~ !

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Svante Arrhenius 19/1 1924.

Sehr geehrter Herr Doktor

Ich habe Ihren Brief vom 25. Juni 1924 gestern durch Vermittlung des schwedischen Exportministeriums erhalten.

Es gibt eine sehr grosse Literatur auf dem von Ihnen behandelten Gebiet. So viel ich weiss, war Wm. Kewenau der erste welcher eine Zusammenhänge zwischen Polarlichter (d.h. Sonnenflecken) und Entdeckung bzw. Missionen aufgefunden zu haben glaubte (Ende des 18. Jahrh.). Da aber diese Vermutung sich nicht bestätigte in der folgenden Zeit, wurde diese Ansicht meistens verlassen. In Festschrift über Polarlichter finden Sie eine Zusammenstellung, die im Jahre des 19. Jahrh. geht. In neuerer Zeit hat Konversationslexikon Axel F. Enström (Ingenieurwissenschaftsakademie, Stockholm) die Thesen Kewenaus aufgenommen in seiner Abhandlung "Die polare Polarlichter: Die ökonomische Lage und die klimatischen Veränderungen" (Stockholm 1914, Technische Bibliothek 1914). Er parallelisiert die Sonnenflecken mit den Missionen, den ökonomischen Krisen und danach folgenden politischen Ereignissen und Kriegen. Die Perioden der polen-Krisen 1100, 1814 und das Kriegsjahr 1914 waren durch geringe Sonnenaktivität gekennzeichnet. Eingehend
Svante Arrhenius.

Letter from Svante Arrhenius to A. L. Chizhevskiy of 19 January, 1924.

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I was ~~Especially drew me~~ *attached to* the sun ! All books about the sun, which I found in the library of father and in Kaluga urban library, were by me conscientious ~~were~~ *ly* studied. Everything, which is possible, was extracted from the largest stores of Moscow and Petrograd. ~~Demands~~ *Requests* ~~about the books,~~ *abstract* the extractions, references flew to the libraries of different cities. The books of Young, Abbot, Arrhenius ~~made by my~~ *became* ~~desk~~ table handbooks. I penetrated into the observatory of Moscow University in Presnya" 1.

FOOTNOTE 1 From the memoirs of A. L. Chizhevskiy, stored in the archives of the widow of N. V. Chizhevskiy. END FOOTNOTE

In 1914 took place the acquaintance with K. E. Tsiolkovskiy, *which later turned to* ~~pass over subsequently to~~ *and* friendship, which finally determined A. L. Chizhevskiy's scientific interests, and actually entire his further fate. *Captured* ~~Seized~~ by hypothesis about the existence of the interconnection between the activity of the sun and the terrestrial life, for the first time distinctly formulated by noted astronomer U. Herschel, A.

L. Chizhevskiy since 1915 actively searches² for ~~for it~~ theoretical and experimental confirmation, ^{of it raised} he rises the mountains of literature, ^{and corresponded} it is copied with Svante Arrhenius. Arrhenius ^{was one} ~~some~~ of the first ^{to} ~~showed~~ the existence of correlation between a series of neuropsychic ^{disturbances} and physiological ~~sending~~ and fluctuations of the field of the atmospheric electricity, depending on the sun.

"All around quivers the pulse of the universe" - writes A. L. Chizhevskiy in one of the youthful poems, that ^{belonging} ~~pertains~~ to the year 1918, attempting to transmit ^{his} ~~being~~ inherent in ~~it~~ from early pores ^{view} "space attitude".

^{the} ~~Came~~ ^{has come} time in a most careful manner to study ^{effect} ~~action~~ on the organism of some powerful factors of environment ..., also, first of all of the specifically active emission/radiations of the ^{central} ~~inner~~ body of our planetary system - sun", emphasizes A. L. Chizhevskiy the main thought, which ^{became} ~~was~~ ^{thought his} the sense of its life, in one of the latter articles ².

FOOTNOTE ² A. L. Chizhevskiy. One form of the specifically bioactive, or Z-radiation, of the sun. In the collection: The world in the universe. Moscow, "Mysl'", 1964. END FOOTNOTE

Into ^{1920's} ~~20-20th~~ years in his works A. L. Chizhevskiy persistently carries out thought about ^{on} the existence of periodic sun-earth dependence. According to ^{his} ~~its~~ views the current of all vital processes, which ^{occur} ~~go~~ in biosphere, is ^{found} ~~located~~ in connection with the periodic activity of the sun, ^{and} ~~it~~ depends on ^a quantity and a quality ^{of radiation} flowing to the Earth space, in particular solar, radiation.

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In our time, when flight into ~~Cosmos~~ ^{cannot be} ~~does not manage~~ without preliminary research on solar "weather", ^{or} ~~but~~ radiobiological and radio-medical experiments - without the lead thick-walled shielding chambers, this not is amazing. But during the years 1915-1920 ^{in the} ~~in the~~ ^{when} ~~consciousness~~ of people ^{had an idea} ~~still hardly entered the representations~~ of X-rays, were obtained the first grams of radioactive material - the proof of the division of material into atoms, for the majority of people, brought up in the traditions of geocentric ideology, ^{the} ~~thought~~ about sun-earth ~~communication~~ ^{reports} /connections sounded at least unusually. A. L. Chizhevskiy's ~~compositions~~ ^{reports} caused perplexity and even frank mockery. ^{of} ~~on~~ their author spoke as about ^a ~~the~~ dreamer, searching ^{on} ~~for on~~ the sun "some ^{kind of} ~~spots~~". This very distressed A. L. Chizhevskiy ^{is} ~~and~~ found reflection in the verses, which he wrote at that time: "Oh you

perceived sunspots with the ^{your} splendid ^{your} impudence of your - ^{I have} did not know
^{no matter how} you, as ~~will be~~ to me clear and close, your sorrows, Galileo" !

But nothing it could force scientist to ^{retreat} ~~step back~~. ^{He} It did not
 doubt the fact that ^{his} its ideas immediately will not be considered:
 "About the exceptional killing sluggishness of the penetration of new
 ideas into the brain of man and the routine of science I judge ^{from} ~~by~~ its
^{my} own bitter experiment. Will be required several decades, before ~~how~~
 in us is found common language with biologists.... The basic
 objections, which to me make, consist in the following: there is no
 need "to climb ~~into sky~~ ^{for an} ~~after the~~ explanation of the phenomena, which
 can easily be understood with the aid of terrestrial ^{facts} ~~reasons~~. Social
 conditions - here is the initial cause of all
 illness/sickness/diseases. Change them - and epidemics will ^{clear} ~~stop~~ to
 exist, although the microorganisms can be preserved on terrestrial
 globe".

In this treatment of epidemic phenomena ^{there is great} ~~consists large~~ truth.
^{Clearly, social conditions cause epidemics of all types...} ~~But to narrow question to such an extent, to~~ ^{remove} ~~uncover~~ man and
 microorganisms from the natural medium - the surrounding world with
 all his electrical radiation, flows and fields - this ~~it means~~ to
^{enter} ~~inflow~~ into the ^{greatest} ~~roughest~~, unpardonable error and to preach thoughts,
^{having} ~~nothing~~ in common with the tendency of contemporary science ~~having~~.
^{No, both} ~~There is no~~, and ^{or all} ~~man and~~ ^{are social beings} ~~microbe~~ - ~~essence not only~~ ^{and} ~~social~~, but also

space, connected by their entire biology, all ^{their} molecules, all particles of bodies with ~~Kosmos~~, with its ray/beams, flows and fields....

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Fortunately, increasingly more frequent and more frequently begin to be encountered the minds, which ^{consider the} ~~count~~ ^{to be} world by something single. ^{ular} My compatriots: professor V. M. Bekhterev, professor D. K. Zabolotny, professor G. A. Ivashentsev, doctor S. T. Bel'khover et al. completely ~~they~~ ^{of the} share this point of view into participation in the epidemic phenomena of the factors of space and epidemic phenomena" 1.

FOOTNOTE 1 Translated from the book: A. L. Tzhijevsky. Les epidemies et les perturbations electromagnetiques du milieu exterieur. Paris, 1938. END FOOTNOTE

Later, ^{thinking back} ~~again returning mentally by~~ ^{on} this time, ^{he} it confirms: "Not only N. A. Semashko, G. A. Ivashentsev and S. T. Vel'khover, but also many other prominent scientists supported or were interested in my investigations, in ^{at all} any way without considering them fantastic

hypotheses. These scientists already at that time knew that the statistical laws are completely equivalent to laboratory experiment. ^{Among these} In the number of such scientists were academician V. I. Vernadskiy, academician D. K. Zabolotny, academician P. P. Lazarev, K. E. Tsiolkovskiy, academician A. V. Leontovich, professor A. A. Sadov et al., as orally or printed expressed positive opinion about these investigations ..." 2.

FOOTNOTE 2 Op cit. END FOOTNOTE

Among the adherents of A. L. Chizhevskiy especially one should note V. I. Vernadskiy, who created ^{at} in the beginning the XX centuries the study of ^m biosphere. Approximately in the same years Vernadskiy wrote: "Cosmic radiation ¹ always and continuously ^{pour} flows to the face of the Earth ^a the powerful flow of forces, which imparts ^a special, new character to parts of the planet, that border to outer space. Because of cosmic radiation the biosphere obtains in all its structure new, unusual and unknowns for a terrestrial substance substances.... The living substance of the biosphere because of them is penetrated by energy; it becomes active, it accumulates and distributes in biosphere the ^{energy} obtained in the form of emission/radiations energy, it converts it finally into energy in the terrestrial medium, free,

capable of producing work. The formed by it terrestrial surface shell cannot, thus, be considered as region ~~only~~ of substance, ^{along} this ^{is} ~~the~~ ^a region of energy, the source of a change in the planet by external space forces. The face of the Earth by them is changed, by them to a considerable degree it is modelled. ^{This is} ~~it~~ not there ~~is~~ the only reflection of our planet, the manifestation of its substance and its energy - it ^{is} ~~simultaneously is producing~~ ^{the product of} the external forces of Cosmos.

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A. L. Chizhevskiy (1949).

Therefore the history of biosphere is sharply different from the history of other parts of the planet, and its value in planetary mechanism completely exceptional. ^{It is} ~~it~~ to the same degree, if not to ^a ~~a~~ larger degree, ^a ~~there is~~ creation of the sun as ^a ~~the~~ development/~~detection~~ of the processes of the Earth. The ancient intuitions of the great religious creations of humanity ^{about} ~~about~~ the creatures of the Earth, in particular about people as children of the sun, ^{are} ~~(much~~ nearer to truth than ^{the ideas of} ~~think~~ those, ^{who} ~~which~~ see in the creatures of the Earth ~~the~~ only ephemeral producings of blind and random changes of the terrestrial substance, terrestrial forces. The creatures of the Earth are the creation of complex space process, ^a ~~the~~ necessary and regular part of the ordered space mechanism, in which, as we know, ^{is} ~~are~~ no chances" ¹.

FOOTNOTE ¹ V. I. Vernadskiy. The biosphere in space. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

In the secrets of this space mechanism of terrestrial life tried to penetrate A. L. Chizhevskiy. His book "Les epidemies et perturbations electromagnetiques du milieu exterieur", published in

1938 in the French language, dedicated to the effect of the periodic activity of the sun on epidemic process, brought to the author world ^{fame} glory.

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In 1939 A. L. Chizhevskiy was chosen together with d'Arsonval, Langevin and Branley honorary President of the I International congress on biological physics and space biology.

Through all the tests Aleksandr Lenidovich it carried ~~past~~ confidence in the truth of its ^{his} scientific persuasions. They say that ^{only} the profession ^{leaves an} superimposes impression on ^a man. Those, who were sign ^{acquainted with or} or it was friends with ~~him~~ professor Aleksandr Leonidovich Chizhevskiy, always ^{attributed to him a} ~~drew in it~~ clear mind, kindness, generosity, kindness, large spiritual culture, ^{was as if he} ~~it had been seemingly right~~ through pierced by invigorating sun rays.

~~In~~ ^{does not contain} The book "In the rhythm of the sun" ~~not entered~~ many facts, found by science and confirmatory ^{in this} intimate sun-earth communication/connections. After several ~~summer~~ years, passed from the day of A. L. Chizhevskiy's death (1964), heliobiology it accumulated many facts and it continues to impetuously be developed. The reader will find them in the works of contemporary

heliobiologists. ^{We} ~~us~~ only ~~it~~ wants again to emphasize that time
"works" on the idea, expressed half a century back/ago by A. L.
Chizhevskiy, and free^{ly} ~~releases~~ in the history of science for ^{his} ~~its~~ name
^{the} ~~that~~ place, which it deserves rightfully.

In conclusion I consider ^{it} ~~my~~ ^{duty} long to express deep gratitude for
the granting of archive and aid in preparation of the manuscript for
the press ^{to} ~~Nina~~ Vadimovna Chizhevskaya, the widow of professor
Aleksandr Leonidovich Chizhevskiy.



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